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MUNICIPAL GOVERNMENT SURVEY ADVISORY COMMITTEE

CITY AND COUNTY OF SAN FRANCISCO

REPORT ON A STUDY

OF THE

DEPARTMENT OF PUBLIC WORKS

Vol. I

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January 9, 1952

Prepared by
Griffenhagen & Associates
Consultants in Public Administration and Finance

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The Chairman and Members
Municipal Government Survey Advisory Committee
Board of Supervisors
San Francisco, California

Chicago 1
January 9, 1952

Dear Sirs:

On the recommendation of the Municipal Government Survey Advisory Committee, the City and County of San Francisco in July, 1951, retained us to serve it by making a study of the Department of Public Works. The results of this study, made under the guidance of the advisory committee, are presented in the accompanying report. During the study, numerous conferences were held with committee representatives and monthly progress reports summarizing the findings and recommendations were made to the committee.

The City and County of San Francisco is fortunate in having its public works affairs under able and competent direction. The public works management is alert and progressive. The technical and professional work of the department is sound and in most instances represents the best accepted practice. It is only in the management aspects of the work that any important opportunities are found to effect improvements or savings.

It is believed that this report on the Department of Public Works will provide a detailed and valuable management tool for the department itself. The report analyzes the internal organization, procedures, and facilities of each unit of the department and is necessarily of considerable length. The detailed treatment of the problems will be valuable for the continued use of the department's executives. An overall summary and evaluation of each major phase of the department's operations is provided as a preface to the body of the report. This summary should be of value to those who want a short digest or who do not read the entire report.

The objective of the detailed study of the department's operations was to find the opportunities for improved service and greater economy of operation. It is our belief, which is shared by the public works management, that the report represents a blueprint for improved public works service to the citizens of San Francisco. This improved service can be rendered at a substantial, tangible saving of some $200,000 annually, as specifically shown in the report. We wish to emphasize that these savings are not wishful estimates that might result if a number of things were done in the future

but, instead, are immediate, practicable reductions in expenditures of the department to be secured by implementing the recommendations made in the report. It must be emphasized, however, that further more or less intangible savings, not evaluated herein, should result from better supervision, better utilization of manpower, better organization, and improved administration generally, and may be of even greater benefit to the City and County.

We thank all of the employes and the officers of the Department of Public Works who assisted us in securing the information needed for this project. We acknowledge gratefully the helpful cooperation we have received from the members of your committee and from your committee's executive director.

Yours faithfully,

Griffenhagen & Associates

Griffenhagen & Associates

SUMMARY OF FINDINGS AND RECOMMENDATIONS

1. General Statement

This report presents the findings of a detailed study of the department of public works of the City and County of San Francisco, made for the purpose of identifying opportunities to improve the organization, procedures, facilities, and general management of public works operations. The conclusions that have been reached and the recommendations that have been made for improving the effectiveness or for reducing the cost of the department operations and services are summarized here. A detailed discussion of the present management of the department, giving major emphasis to the analysis of problems, difficulties, or weaknesses that now exist, and pointing out the corrective measures that now exist, and those believed to be the most suitable, is given in later chapters of the report.

The summary of findings and recommendations in this part of the report is intended to provide a resume of the whole plan for improving the organization, procedures, facilities, and general administration of the department. It is arranged according to the major activities and services of the department, headed by a section dealing with general public works administration, and followed by chapters dealing with engineering, architecture, street maintenance, building maintenance, street cleaning, sewer maintenance, building inspection, central permit service, accounting, and equipment.

A reference to the main part of the report is given for each recommendation in this summary so that the pertinent discussion and analysis may be found easily. The reference shows the chapter in roman numerals, the main section of the chapter in arabic numerals, and the subordinate division of the section by lower case letters as (III-9c) which means Chapter III, Section 9, Subdivision c.

2. As to the General Administration of the Department

The general direction of the department is of a very high order. The broad administrative policies are good and the management is energetic, alert, sincere, and professionally sound. The city is very fortunate to have such an able and well qualified director and such competent and enthusiastic heads of the major branches of the department.

The present director of the department has held that office only a short time, but has already made some important improvements in the management of the work. Other changes are already planned including some of those mentioned in this summary.

One of the weaknesses, observed throughout the study, is inadequate supervision of several of the activities of the department, sometimes because the supervisors have to spend too much time in city hall or field offices, sometimes because there are not enough supervisory employes, and occasionally because the supervisors do not discover existing inefficiencies. An important step toward correcting this situation has been made by the recent addition of the position of assistant director for maintenance and operation, to provide a branch head for the operating bureaus. The expansion of management analysis will provide further means of discovering and correcting ineffective work.

Certain administrative devices are not used to the best advantage in the management of department affairs. There is no administrative manual or any written description of the details of the organization plan in effect. The periodic reports on operations and costs are very late and are otherwise inadequate to provide supervisors and officials with the information that is needed for the best conduct of the work. The complaint system is not controlled positively and is not utilized to detect weaknesses in the services or operations. There is almost no use of consultive supervisory meetings to simplify administrative work and to foster the participation of subordinate supervisors in the administration of public works affairs.

As to the activities of the general office of the department, the work is well performed, but the organization should be simplified somewhat and the scope of certain activities should be studied. In particular, there is no departmental personnel agency for interpreting rules, and for generally advising officials and employes on personnel matters, the personnel unit merely handling the clerical details of personnel records. The telephone exchange service is too decentralized to provide effective and economical operation.

The recommendations made with respect to the general administration of the department are summarized in the following paragraphs:

1. Create in the office of the director a unit or office of management analysis, and expand the activities now performed by a single engineering analyst. (II 3b)

2. Adopt officially specific names for the organization units of the department and specific administrative titles for the supervisors, and use these names and titles on all official orders, procedures, and correspondence. (II 3b)

3. Adopt a definite series of designations for organization units of the department for the various echelons, preferably branch, bureau, division, section, and unit in the order of descending rank; and, specifically, change the name of the bureau of engineering to engineering branch, to conform with administrative branch and operations branch, and designate the present divisions of the engineering branch as bureaus. (II 3b)

4. Prepare an administrative manual for the department, in loose-leaf form, to show the function, responsibility, authority, and duties of each organization unit of the department; to explain the relationships among units and with other departments; and to define the administrative procedures that affect the whole department. (II 3e)

5. Extend the development of manuals of practice to additional bureaus, divisions, and activities, and utilize the office of management analysis to assist in the preparation of the manuals and to maintain, for the director, a central control over all such regulations issued in the department. (II 3e)

6. Cooperate with the civil service commission, by requesting the reclassification of positions that have been assigned increased responsibilities and duties, and by providing written statements of the work of particular organization units and descriptions of the desired or established positions. (II 4a)

7. Utilize consultive supervisory conferences at the department and branch levels as a means of reaching decisions on administrative matters easily and quickly, and foster the participation of subordinate supervisors in the management of the department. (II 4b)

8. Prepare the annual reports of department activities promptly after the close of each fiscal year, and publish the reports not later than the first of October. (II 4c)

9. Develop and install a simple and well-integrated system of current operational reports throughout the department so that supervisors will be supplied promptly with information on progress, performance, and cost, needed to administer the activities intelligently, and so that the department officials will receive regularly concise summaries of accomplishments and costs. (II 4c)

10. Staff the proposed office of management analysis with a minimum of three employes: a management analyst, an administrative analyst, and a statistical clerk; and make the office responsible for assisting the director in the administration of the department, by analyzing reports and developing summaries, by keeping suitable historical and comparative records of progress, performance, and cost, by developing and registering regulations, orders, and procedures for the director, and by helping the director prepare for important staff and other meetings. (II 4d)

11. Develop and institute a simple but positive means of controlling and reporting on complaints made on public works services or operations, for the purposes of insuring the prompt investigation and handling of complaints, and of using the information on justified complaints to improve the administration of the departments services. (II 4e)

12. Expand the functions of the contral personnel unit to include interpreting civil service rules and regulations for the department, drafting personnel letters and memorandums for review by the assistant director for administration, and serving generally as the reference point for personnel matters in the department (II 5c)

13. Transfer the position of general clerk-stenographer, handling minute and order work, to the secretarial unit of the office of the director (II 5c)

14. Establish one central telephone exchange for the city hall. (II 5c)

15. Study telephone requirements of city and county building, other than the city hall to determine what telephone services in these buildings can be served from a central exchange in the city hall. (II 5c)

16. Transfer the department physician position to the expanded central personnel unit (II 5c)

17. Develop a uniform card system in the department as a reference for referred correspondence. (II 5d)

18. Develop a simple filing manual for the department as a whole. (II 5d)

19. Review and simplify the director's order procedure. (II 5d)

20. Provide better quarters with improved lighting for the city hall telephone exchange. (II 5d)

21. Provide for the inclusion of the physician's preliminary diagnosis of an employe's illness on the department physician's report form. (II 5d)

3. As to Engineering Services

The bureau of engineering provides a very high level of technical engineering service that compares favorably with the recognized and accepted practice in other large metropolitan areas. The work is performed effectively and economically, for the most part, despite some serious handicaps caused by unsatisfactory working space and lack of equipment, and some difficulties that stem from outside the department.

The weaknesses found to exist are almost entirely administrative in character and generally can be traced to the recent growth of the services without suitable organization and other management changes having been made to accompany such expansion. A tendency has been noted and is found throughout the department, to skimp on supervision and, in consequence, to require key personnel to carry too great a load of administrative detail which prevents their making the best use of their time. The city engineer, for example, has a tremendous administrative load that should be lightened so that a greater proportion of his time can be devoted to administrative and technical planning, to field review of the work, and to public relations.

The recommendations that have been made on the engineering service are summarized as follows:

1. Relieve the city engineer of some of the administrative detail now handled by him, by relieving the assistant city engineer of his duties as the head of a major division, and assigning to him the responsibilities of directly supervising the staff affairs of the bureau, and of assisting in the supervision of the line units. (III 3a)

2. Consolidate the strictly street design work with the other design activities of the bureau, and place the street investigation, permit, assessment, and investigation work in staff offices of the bureau. (III 3a)

3. Give consideration to the adoption of the general organization plan proposed for the bureau, which provides for five line divisions (design, surveys and maps, construction, traffic engineering, and sewage and waste treatment) and for five staff offices (contract control, permit and inspection, assessment, plans and budgets, and administrative services). (III 3a)

4. Reorganize the design division by providing for the inclusion of street design activities without increasing the span of command and by establishing seven sections (structural, sewer, mechanical and sewage treatment, highway, street, electrical, and design coordination sections). (III 6c)

5. Give consideration to the eventual consolidation of the street and highway design work in one section of the division. (III 6c)

6. Adopt administrative titles for the supervisory positions of the bureau that describe as nearly as possible the duties of the positions. (III 3a)

7. Establish two sections in the division of surveys and maps: a map section to be headed by a maps engineer and to be in charge of the map, subdivision, and records work; and a surveys section to be headed by a chief surveyor. (III 7c)

8. Provide that the proposed chief surveyor shall spend a substantial part of each day in the field in actual supervision of the survey parties. (III 7c)

9. Revise the present accounting practices, if this can be done under existing laws, so that an engineering employe's time (either in a budget or interdepartment position) may be charged to a budget account or a work order to represent exactly the way his time is spent. (III 7d, III 161)

10. Study the present classification of the positions of surveyor's field assistant (F-604) and that of instrument man (F-606), particularly in relation to the rate of compensation in comparable private employment, and increase the salary for those positions if an increase is found to be justified. (III 7e)

11. Reorganize the traffic engineering work of the city for the purpose of eliminating existing duplication and overlapping of responsibilities and duties; assign the traffic engineering functions as provided in the national model traffic ordinance; and place the traffic engineering work defined therein under the bureau of traffic engineering of the department of public works. (III 8c)

12. Amend the charter, if this is found to be necessary, to eliminate any provision that tends to prevent the assignment of traffic control duties to the police department and to the department of public works as provided by the nationa. model traffic ordinance. (III 8c)

13. Study the civil service examination practices used in filling positions of construction supervisor and resident engineer to find a fair means of testing and recognizing construction supervision proficiency, and give consideration to holding unassembled examinations for such positions and to making special classes of resident engineer positions. (III 9c)

14. Organize the construction supervision work into two or three groups; place an assistant construction engineer at the head of each group; and assign projects to the groups on the basis of geographical location or kind of work involved. (III 9d)

15. Retain the control of sewage treatment plant operation in the bureau of engineering until the processes are running smoothly and the difficulties have been worked out. (III 10c)

16. When the operations of the new sewage treatment plants are normal, transfer the operating function from the bureau of engineering and place it in a new bureau under a manager of sewage treatment plants, who would report directly to the assistant director of public works maintenance and operation. (III 10c)

17. Provide a qualified secretary position to head the sewage treatment plant operation, so that the top management of the unit may be independent of the organization of the southeast plant. (III 10d)

18. Arrange to make necessary engineering investigations and studies, essential to the satisfactory operation of sewage treatment works, either by using specialists from the engineering units for particular studies, or by providing a small staff as a part of the operating organization. (III 10d)

19. Establish an administrative services office for the bureau, and provide two sections, a records section and a stenographic pool. (III 11b)

20. Transfer to the office of the assistant director of public works for administration the work of tabulating bids and preparing contract documents, and transfer also the employe who now conducts this work, (III 11b)

21. Develop a regular program of maintenance engineering and provide consulting engineering service for special problems of the operating branches and for review of the methods, practices, and equipment used. (III 16a)

22. Review the inspection fees collected for supervising street excavation work, and propose increases, if necessary, to make the service self-supporting. (III 16b)

23. Speed up the systematic inspection of sidewalks so that all walks in the city may be completed within a two year period. (III 16c)

24. Make a comprehensive survey of pavement condition as the basis for developing sound maintenance and reconstruction programs. (III 16c)

25. Consider the establishment of a sidewalk repair service by the department to authorize the city to repair those walks not fixed by the owners after due notice, and to bill the owners at a flat rate or at actual cost, and to place the charge on the tax bills if not paid. (III 16d)

26. Prepare complete pavement designs for all city or assessment pavement projects before those projects are advertised for bids, and develop the necessary design data for each private construction paving job when the permit is issued. (III 16e)

27. Secure the data, including historical trends and current prices, required for making sound cost estimates on public works improvement projects. (III 12f)

28. Provide for the review of plans and specifications by the division of construction before the projects are advertised for bids. (III 16g)

29. Amend the charter provision that requires specific approval of contract extras and changes by the chief administrative officer and the controller, and authorize the director of public works to approve in writing extras and changes that amount to less than $2,000. (III 16h)

30. Review the ordinance that requires continuous inspection of garbage disposal operations with the idea of repealing it if continuous inspection is not required, or of providing such inspection if it is needed. (III 16i)

31. Repeal the ordinance that requires the police commissioners to recommend and the board of supervisors to approve all boulevard stop signs, and place the responsibility for installing the signs with other traffic engineering work. (III 16k)

32. Require all engineering employes to report their time on projects or accounts to the nearest hour rather than the nearest 8 hours as at present. (III 16m)

33. Utilize more extensively the written standard practice instructions or procedures that have proved very satisfactory in some units. (III 16n)

34. Review thoroughly the records of accepted streets and recommend suitable action to the board of supervisors for clearing the status of each street section on which records are inadequate.

35. Make suitable arrangements for parking city-owned cars used by engineers who have to spend part of their time at the city hall, either by reserving a few parking stalls on an adjacent street or by securing a parking lot or garage nearby. (III 17c)

36. Provide suitable space for the bureau of engineering so that each unit may be together and have sufficient area, and so that the units of the bureau may be in one building and arranged as compactly as is practicable. (III 17d)

37. Provide small cameras to inspectors and engineers on certain kinds of work so that photographic records can be made of structure that may be covered or of conditions that may be the source of claims against the city. (III 17e)

38. Review the cost of owning as compared to leasing automobiles for the bureau, and if the cost figures indicating that city ownership is substantially cheaper are found to be correct, purchase new automobiles for the bureau to replace the leased machines. (III 17f)

4. As to Architectural Services

The bureau of architecture is responsible for providing architectural services to other city and county agencies. This responsibility involves the preparation of architectural plans and specifications and also the review of such plans and specifications when prepared by outside contracts. Basically, the job of the bureau is to act in an advisory and consulting capacity, a traditional function of architectural agencies.

The rapid growth of the bureau staff, from approximately ten positions in 1948, to 62 at the present time, has necessitated a complete change in the organization and in the policies and procedures of the bureau. In some respects the bureau has effected the necessary changes and generally is doing a good job in handling the large increase of work. The charted organization plan of the bureau is good, but the bureau has not approached the organizational problems realistically and the actual organization structure and relationships are not entirely in accord with the reported plan.

Certain procedures with respect to building modifications can and should be revised. The cost of making inspections should be analyzed and reported accurately. Supervision over temporary building inspectors should be strengthened to ensure effective and economical inspection. The recommendations that have been made on the architectural service are summarized as follows:

1. Develop and report accurately the plan of organization for the bureau and define the authority and responsibility of every position in the bureau in order to eliminate the present confusion and misunderstanding. (IV 4a)

2. Relieve the city architect of the responsibility for making personal reviews of routine requests for repairs and alterations work and delegate such duties to the head of the maintenance division. (IV 4b)

3. Establish a part-time position of building alteration inspector for the supervision of temporary building inspectors during the summer school alteration and repair period. (IV 4c)

4. Request a reclassification of the position of general clerk stenographer at the head of the office services division. (IV 4d)

5. Make greater effort to ensure the completeness of all architectural plans prior to actual building construction in order to keep contract modifications to an absolute minimum. (IV 5b)

6. Amend the charter to simplify the contract modification procedure and to authorize the director of public works to order, without other approval, changes and extras in contracts up to the amount of $2000 for each such change.(IV 5c)

7. Make periodic analyses of the costs of inspection in order to determine the causes of excessive costs, and take steps to eliminate or reduce such causes. (IV 5d)

8. Maintain records of inspection costs to show the actual inspection costs for each individual project. (IV 5d)

9. Maintain bureau records to show the total costs of building construction and use them in reporting the complete costs of individual projects. (IV 5e)

10. Revise present regulations to require the budget personnel of the bureau to report the distribution of their time daily and charge such time, where appropriate, to the respective projects. (IV 5f)

11. Instruct the bureau of architecture to review the maintenance needs and program the maintenance work in all public buildings, and assist the board of education in its present review. (IV 5g)

12. Study the possibility of providing a better use of office space for the bureau of architecture. (IV 6)

13. Make available to the head of the maintenance division the automobile assigned to the city architect, and rent an automobile for the use of the part-time building alteration inspector in charge of the temporary building inspectors. (IV 7)

5. As to Street Maintenance

The streets of San Francisco are maintained in a safe and reasonably smooth condition and, with certain exceptions, the street maintenance work is effectively performed. The bureau of street repair, however, has a much smaller part in the whole program of caring for and maintaining pavements and other street structures than do similar agencies in other cities. The unit does no construction or reconstruction work, only minor resurfacing work, and a very small amount of surface treatment work. Furthermore, all repaving over water department and utility company trenches is done by contractors rather than by the bureau. Rather extensive repaving work is done for the municipal railway, the board of education, the park department, and the department of electricity, but almost none is done for the water department. To secure more effective maintenance work and greater economy of operation, the scope of the work of the bureau should be increased.

Bridge operation expense is extraordinarily heavy in relation to the benefits provided to the users of the Channel Street and Islais Creek waterways, and some means should be found to curtail the operations or to limit further the operating hours for certain bridges.

From the standpoint of administration of the bureau, there are several changes that should be made. The internal organization can be improved with relatively minor changes now, but ultimately much of the work should be organized on a geographical rather than a functional basis. Supervision should be improved, both through more constant field review of the work done, and through a better reporting system. More realistic and usable cost information should be developed.

The mechanization of the operations of the bureau has not kept pace with the increasing cost of labor, and the resurfacing and armor coating operations, particularly, should be mechanized. Similarly, the curb yard work should be mechanized when it is moved from the present location. The obsolete asphalt plant should be replaced as soon as is practicable.

The recommendations on street maintenance may be summarized as follows:

1. Reorganize the bureau of street repair to promote better and easier administration; specifically, reallocate the work of the bureau among the three general foremen so that the amount and extent of responsibility are distributed reasonably equally to make the work load of these divisions heads about the same; and create a resurfacing division, an asphalt repair division, and a concrete maintenance division. (V 3d)

2. Reassign the work of the bureau to place the asphalt plant, the resurfacing work, one cleanup crew, and one pavement breaking crew in the resurfacing division; to merge the asphalt repair crews and the crack sealing crews in the asphalt repair division with a cleanup crew and a pavement breaking crew; and to leave the concrete division, as the third unit, substantially as it is now. (V 3d)

3. Consolidate assignments in rearranging the work so that not more than seven or eight foremen report directly to a general foreman. (V 3e)

4. Make the general foreman of the concrete division completely responsible for all curb work, concrete or brick gutter work, and manhole resetting work, and abandon the practice of transferring the crews to the asphalt division. (V 3f)

5. Designate the granite cutter as head of the curb yard unit with responsibility and authority for the work of the unit, if the proposed mechanization of granite cutting is put in effect; and place one of the granite cutters in charge of the manual operations if mechanization is not introduced. (V 3g)

6. Eliminate the laborer position which carries certain responsibilities for yard and equipment maintenance, transfer the duties of the position to appropriate agencies in the department of public works, and transfer the employe with a part of the work, or assign him to another position. (V 3h)

7. Transfer the two positions of watchman now assigned to the public works yard from the bureau of street repair to the bureau of building repair. (V 3i)

8. Assign the bureau of accounts general clerk-stenographer, now working in the bureau, to the bureau of street repair on a full-time basis to do the clerical work of the bureau and only as much work as time permits for the bureau of accounts; and delegate to the bureau of accounts the functional supervision of the clerical work performed. (V 3j)

9. Adopt at once the recommended revised plan of organization in order to correct some of the weaknesses due to unequal distribution of work. (V 3k)

10. When the scope of the work of the bureau is increased, change the basic organization plan for repair work from a functional to a geographical arrangement, create two or three maintenance districts, and provide that each district shall handle its own patching, repairs, trench repaving, and general repairs to curbs, sidewalks, stairs, fences, and other street structures. (V 3k)

11. Consider proposing a charter amendment to permit the department of public works to do certain defined kinds of repair work by force account up to a maximum limit of $5000, but retain the present $2000 limit for purchases and other work, if desirable. (V 4b)

12. Provide that the bureau of street repair shall submit bids for force account work (work done by the forces of the bureau) for those contracts which it is able to undertake. (V 4b)

13. Determine the amount of major construction and resurfacing work to be undertaken by the bureau for a year, on the basis of a work program, and fix the size of the permanent force to do that work without the necessity of making additional work, of releasing employes, or of employing extra part-time help. (V 4b)

14. Revise the present procedures for repaving utility openings to require temporary paving over each opening with a cold patch or cut back mixture, and delay final repairs at least one to three weeks depending on the trench depth. (V 4c)

15. Consider placing the responsibility for the permanent repavement of all utility openings in the bureau of street repair. (V 4c)

16. Designate the bureau of engineering or the bureau of street repair to carry out more intensive research in materials, mixes, and methods of asphalt manufacture. (V 4d)

17. Make an analysis of the performance and cost of the various repair and resurfacing crews on comparable work as an aid to the administration of those activities. (V 4d)

18. Make a careful study of the relative merits of the bitumul repair method and the asphalt repair method, and increase the use of bitumuls patching if it is found to be as satisfactory as asphalt patching. (V 4e)

19. Report the unit costs for bitumuls patching on a square foot basis, and report separate costs for resurfacing, patching, and repaving. (V 4e)

20. Use the armor coating or surface treatment method of pavement maintenance much more extensively than at present on residential or any other low traffic volume street, and utilize modern methods, equipment, and suitable materials in doing that work. (V 4f)

21. Secure a new chip spreader and roller of proper size and kind in order to provide better surfaces and to reduce the cost of the armor coating or surface treatment methods of pavement maintenance. (V 4f)

22. Use plant mixed concrete to the greatest extent practicable, and develop and put into effect written procedures for hand mixing concrete. (V 4g)

23. Report monthly the unit costs of concrete curb construction and repairs and the cost of granite curb repairs. (V 4g)

24. Mechanize the operation of the proposed new curb yard by providing modern equipment for handling, cleaning, and dressing granite curb. (V 4h)

25. Eliminate two granite cutter positions in the curb yard in connection with the mechanization, and substitute one laborer position. (V 4h)

26. Eliminate the watchman position during the 11:00 p.m. to 7:00 a.m. shift on all three bridges under the jurisdiction of the bureau. (V 4i)

27. Make a comprehensive administrative study of bridge operations in order to explore all possibilities of reduced operations. (V 4j)

28. Discontinue the operations of the Fourth and Channel bridge during the 11:00 p.m. to 7:00 a.m. shift and eliminate the position of operating engineer on that shift. (V 4j)

29. Replace the wooden deck on the Third and Channel bridge with a deck of steel construction. (V 4k)

30. Provide more complete and energetic supervision of field operations by the supervisory staff of the bureau, and ensure that that staff devote a considerable proportion of its time to field supervision, with the head of the bureau spending approximately two-thirds of his time in the field, and division heads devoting approximately 90 percent of their time to supervision and field scheduling and planning. (V 4l)

31. Make an annual survey of streets on a systematic basis to identify exactly the kind of work that needs to be done on each; classify the work according to urgency and kind of work to be done; and develop a plan and schedules of street maintenance from the information acquired. (V 4m)

32. Redesign the forms used for field reports in accordance with the changes in the accounting procedures recommended in another part of this report. (V 4n)

33. Revise the cost accounting procedure to provide for the development of useful and meaningful cost analyses by crews and by activity, and develop an activity classification for street maintenance work. (V 4n)

34. Develop cost accounts promptly after the end of each month, so that the summaries and analyses are in the operator's hands by not later than the tenth of the following month. (V 4n)

35. Include all items of cost in the expense records for street maintenance equipment, and summarize and make periodic reports of equipment expense and performance to bureau and department officials. (V 5b)

36. Carefully select the kind, type, and size of needed equipment to meet the requirements of the bureau; develop precise specifications to insure the acquisition of that equipment; and submit detailed justification statements to the proper authorities to warrant the purchase of such equipment. (V 5c)

37. Conduct research on asphalt plant construction and asphalt mixes and, if found warranted, design the proposed plant to produce mixtures with two or more kinds of bituminous material. (V 5d)

38. Prepare annual budget requests on the basis of a work program showing the details of proposed annual operations. (V 6b)

39. Make a comprehensive analysis of pavement replacement over side sewer trenches and fix the rates to be charged at about the average actual cost. (V 6d)

40. Adopt a simple system of overhead charges by estimating the overhead percentages on the basis of the preceding year's work, apply the fixed percentages for the first eleven months of the year, and make actual adjustments through an overhead account for the last month. (V 6e)

41. Establish a revolving account for the asphalt plant and fix asphalt prices to cover the entire cost of plant operations, including overhead, for producing the asphalt mixtures. (V 6e)

6. As to Public Building Maintenance

Much of the work connected with the repair and maintenance of public buildings is centralized in the bureau of building repair. This policy is sound and perhaps the service should be expanded. However, there has not been a coordinated city and county program to determine what repair and maintenance work will be undertaken by the bureau of building repair and what will be handled by individual agencies with their own forces. This makes it impossible for the bureau to plan and schedule its work in advance.

Effective administration and control in the bureau of building repair is made especially difficult because of the varied, specialized tasks that must be undertaken. In many respects the bureau is doing an excellent technical job. However, necessary management control and supervision are somewhat deficient at all levels in the bureau.

It is believed that, if the recommendations relating to building repair and maintenance are carried out, an eventual annual saving of approximately $40,000 a year will be realized.

The recommendations expressed or implied on the maintenance and operation of public buildings follow:

1. Enact ordinances to include a complete statement of the functions of the bureau of building repair to be developed as a result of consultation with all city and county agencies. (VI 2)

2. Establish a policy as to what, if any, building repair activities are to be handled independently by various city agencies other than the bureau of building repair. (VI 3c)

3. Group the craft units of the bureau to form a repair division and assign the assistant superintendent to head this division. (VI 3d)

4. Relieve the clerk of the bureau of building repair of the duties of part-time switchboard operator and assign the clerk position to the bureau on a full-time basis. (VI 3e)

5. Place the responsibility for supervising the janitorial unit in the city hall, the public works yard, the civic center buildings, and the police stations on the chief operating engineer of the city hall, directly responsible to the superintendent of the bureau. (VI 3p)

6. Place the responsibility for supervising the janitorial unit in the hall of justice on the chief operating engineer of the hall of justice, directly responsible to the superintendent of the bureau. (VI 3p)

7. Transfer a position of watchman from the bureau of building repair to the bureau of street repair. (VI 3q)

8. Improve supervision practices in the bureau and require the superintendent and his assistant to initiate a program to train foremen in administrative and supervisory practices. (VI 4b)

9. Require the craft foremen to exercise positive supervision over bureau personnel permanently assigned to public buildings, by making frequent inspections of work performed by such personnel. (VI 4c)

10. Require that the superintendent discontinue making detailed reviews of requisitions for materials and delegate this responsibility to the general foreman of operating units. (VI 4d)

11. Require that the superintendent make periodic spot checks of jobs by going to the jobs, checking the amount of materials used against the requisitions, and reviewing the work for quality of performance and completeness. (VI 4d)

12. Require that the supervisor of janitors accept the responsibility of actually supervising custodial employes assigned to all buildings under his jurisdiction. (VI 4e)

13. Assign to the foreman janitor, presently acting as the assistant to the supervisor of janitors, the responsibility of supervising the afternoon and night shifts by arranging his working hours so that he will be at his post during the afternoon and evening. (VI 4e)

14. Abolish a janitor position on the afternoon shift at the city hall and establish in lieu thereof a position of working foreman janitor to provide supervision of the afternoon crew. (VI 4e)

15. Define the extent of the responsibility of the bureau of building repair regarding building operations for all public buildings. (VI 4f)

16. Prepare job estimates on the basis of unit work measurements and use these measurements in maintaining records of performance and in reporting the operations of the bureau. (VI 4g)

17. Require that the superintendent and the assistant superintendent make periodic reviews of job estimates to ensure their adequacy, accuracy, completeness, and uniformity. (VI 4h)

18. Require that, in the units where the general foremen have delegated responsibility for making estimates to subordinate foremen, the general foremen make periodic reviews of estimates. (VI 4h)

19. Discontinue the practice of using supervisory employes to perform clerical work, and assign craft personnel to do such work. (VI 4i)

20. Require that the unit general foremen make clerical assignments on a maximum time basis and make periodic spot checks to justify the time spent on the amount of clerical work performed. (VI 4i)

21. Require the bureau, on the instruction of the director of public works, to submit bids periodically on jobs costing in excess of $2000. (VI 4j)

22. Require craft personnel on regular assignment to public buildings to make a daily report of all activities, showing the kind of work done, the location, and the time spent on each activity. (VI 4k)

23. Require that supervisors review the daily reports of craft personnel on regular assignments for accuracy and completeness and use the reports as a basis for supervision and analysis of performance. (VI 4k)

24. Develop and follow schedules of the various janitorial activities in the public buildings. (VI 4l)

25. Maintain records of window cleaning operations and analyze them periodically to determine whether this activity may be performed by contract at a reduced cost. (VI 4l)

26. Develop unit costs of operation for building repair activities. (VI 6b)

27. Consider contracting any phase of building repair, if the present unit costs are substantially higher than the cost of that work would be on outside contract, and eliminate the bureau unit presently doing the work. (VI 6b)

7. As to Street Cleaning

The streets of San Francisco are kept unusually clean in comparison with those of most metropolitan areas, and the department of public works and the bureau of street cleaning are to be commended for doing such an excellent job. The effort is even more praiseworthy when it is realized that the work is done under unusually difficult conditions. The amount of dirt that reaches the streets is especially large because of unrestrained and careless littering by citizens. High winds move the litter about rapidly and often on to streets that have just been cleaned. Moreover, there are virtually no restrictions on parking, and cars line the curbs day and night, effectively preventing the use of the most efficient cleaning methods. Because of these handicaps, hand methods must be used extensively instead of machines, and more cleaning effort must be expended than should be necessary.

The study of the operations of the bureau has revealed several opportunities to improve the effectiveness or to reduce the cost of the work. They include minor weaknesses in organization, procedures, equipment, and management. Not all of the suggested improvements can be put into effect by the bureau, however, because several involve activities of other bureaus or departments.

It is estimated that a half million dollars can be saved annually if reasonable parking restrictions can be imposed, outside of the business areas, so that machine methods instead of manual operations may be used. Many of the savings, such as the reduction in careless littering or better management of equipment, are more or less intangible and no evaluation of them is attempted, but they may be of even greater importance than immediate specific savings that can be calculated. The more important tangible savings that are possible total $63,800 a year, of which $25,300 may be saved by replacing the large gang trucks with small trucks (recommendation 12), $22,000 may be gained by using regular instead of overtime shifts for week ends (recommendation 5), $6,600 may be saved by providing an equipment washing service instead of requiring the crews to do this work (recommendation 28), $5,000 may be saved by utilizing motor sweepers more effectively (recommendation 11), and $4,900 may be saved by controlling refuse handling in the produce district (recommendation 17).

Specifically, the following recommendations have been made with respect to street cleaning activities of the City and County of San Francisco:

1. Place authority and responsibility for all street cleaning operations in the respective districts under the district directors so that each can be held fully accountable for all activities and for the cleanness of streets in his area. (VII 3b)

2. Establish a position of administrative assistant (possibly assistant superintendent) in the office of the superintendent of street cleaning to analyze and summarize operating data, to make overtime and relief assignments, to conduct public education activities, to develop methods and procedures, and generally to aid in the administration of the bureau. (VII 3b)

3. Transfer the position of clerk-stenographer to the bureau of street cleaning. (VII 3c)

4. Designate names or numbers for the four street cleaning districts for official identification purposes. (VII 3a)

5. Endeavor to have seven day a week street cleaning work recognized as continuous regular government activity so that employes may be assigned to necessary Saturday and Sunday cleaning work on regular shifts instead of overtime assignments. (VII 3c)

6. Make a thorough study of the actual frequency of cleaning all streets with a view to establishing the most effective frequency under existing policies. (VII 4b)

7. Adopt suitable legislation to prohibit all-night parking on business and traffic streets, and to authorize the director of public works to designate "no-parking" periods on residential streets. (VII 4c)

8. Make a study of parking and off-street parking facilities to determine the areas in which parking may reasonably be prohibited now. (VII 4c)

9. Develop and conduct an intensive program of public education devised primarily to reduce the amount of careless littering of streets. (VII 4d)

10. Enforce the anti-littering ordinances of the city, and assign one or more regular policemen to the bureau of street cleaning to aid in public education and enforcement; and charge the cost of these services to street cleaning appropriations. (VII 4d)

11. Operate motor sweepers and other equipment for full eight-hour shifts and arrange to have servicing, broom changes, and other maintenance work performed out of regular hours, preferably by service crews. (VII 4f)

12. Investigate the advantages of the purchase and use of smaller trucks on gang sweeping work. (VII 4g)

13. Organize a separate weed killing crew and secure modern weed spraying materials and equipment. (VII 4g)

14. Utilize to the fullest practicable extent the hand sweeping crews on exclusively gang sweeping routes, and use other crews to supplement machine sweeping work, if this is necessary. (VII 4g)

15. Adopt a simple reporting plan for blockmen to show the amount of cleaning performed. (VII 4h)

16. Make a further study of "paper" truck operations with a view to finding a way of assigning the spot cleaning work to avoid overlapping routes of other crews. (VII 4j)

17. Require the occupants of the produce market area to subscribe to regular refuse collection service and to provide the containers that are specified in existing ordinances. (VII 4k)

18. Enforce, in the produce market area particularly, the ordinances that prohibit throwing garbage and litter on the streets or sidewalks. (VII 4k)

19. Transfer to the recreation and park department, or other suitable agency, the responsibility for maintaining Ingleside park on Junipero Serra Boulevard, and transfer also the gardener position and the park maintenance equipment. (VII 4l)

20. Improve the handling of complaints by preparing complaint notices in duplicate and by reporting on the inspections and complaint action taken. (VII 4m)

21. Replace the present "block" unit of measure with the "curb-mile" unit. (VII 4o)

22. Determine the length of each route in "curb-miles" to permit a crew to report the route number, and the streets that were not cleaned in a route, or the additional streets cleaned. (VII 4o)

23. Establish, with the help of the crews, the best route of travel or sequence of work on each assignment, and then require that the work be conducted according to the adopted plan. (VII 4o)

24. Prepare weekly reports of performance for each district, each activity, and each crew. (VII 4o)

25. Retire street cleaning equipment systematically when it has reached the end of its economically useful life, and develop a program of replacement to attain this position in four or five years. (VII 5c)

26. Give consideration to a more positive plan for managing street cleaning equipment including a preventive maintenance program. (VII 5i)

27. Improve equipment records to show the total cost of operating, owning, and maintaining each item; and prepare promptly each month a report of cost and use. (VII 5e)

28. Establish an equipment servicing crew so that chauffeurs and crew members will not have to take time from regular activities to wash, service, or adjust equipment. (VII 5f)

29. Provide an adequate number of reserve units of equipment to permit the prompt replacement of trucks or machines that may break down; and specifically, maintain at least one flusher, one motor sweeper, one bucket loader truck, and one covered dump truck to be utilized as spares. (VII 5g)

30. Determine the size and type of equipment to be used on the basis of actual field tests of several sizes and types, and on the basis of unit cost for performing street cleaning work. (VII 5i)

31. Develop the budget for street cleaning on a work program basis, and include in it the anticipated work on state highway routes. (VII 6c)

32. Consider the advisability of abandoning the present practice of deducting from current expenditures the receipts from cleaning state highways, and instead pay the amounts into the general fund and authorize gross expenditures in the budget for street cleaning work. (VII 6c)

8. As to Sewer Maintenance

The efficient maintenance of the city's sewage collection system is necessary in order to ensure public safety and health and to prevent damage to property. The bureau of sewer repair, which is charged with this responsibility, is doing good work in keeping the sewers clean and in good repair. Its general methods of doing the cleaning and repair work are well suited to the conditions that prevail. The supervision of the work is inadequate, however, and the plan of internal organization and several operating practices can be greatly improved. If these and other administrative weaknesses can be corrected, the work can be performed more economically. Certain other needed improvements require action outside the bureau. Some of the actions recommended made in this report have been desired by bureau personnel for some time, but without success.

The recommendations expressed or implied with regard to sewer maintenance are summarized in the following paragraphs:

1. Regroup the present activities of the bureau so that the bricklaying, the main sewer repairing, and the side sewer repairing are placed in a sewer construction and repair division; and the catch basin cleaning, the sewer cleaning, the sewage pumping operating, and the miscellaneous services activities (called special services in the proposed organization) are allocated to a sewer operation division. (VIII 5a)

2. Place the sewer cleaning operation under the supervision of a foreman directly responsible to the head of the sewer operation division. (VIII 5b)

3. Designate a bricklayer as a bricklayer foreman and assign him as head of the brick repair unit responsible directly to the head of the sewer construction and repair divisions. (VIII 5c)

4. Divide the supervisory responsibility over the catch basin cleaning and miscellaneous services activity by assigning the present foreman to catch basin cleaning and assigning a new foreman to supervise the miscellaneous services; and make both foremen directly responsible to the head of the sewer operation division. (VIII 5d)

5. Make the engineer, presently assigned to the bureau, responsible for the office services of the bureau and extend his functions to include the analysis of performance and cost data and the investigation of operating methods and procedures. (VIII 5e)

6. Assign the engineer, now on a part-time basis from the bureau of engineering, directly to the bureau of sewer repair on a full-time basis.(VIII 5e)

7. Compile summaries of catch basin cleaning operations accurately to show the disposition of eductor units for every hour worked or used. (VIII 7c)

8. Use the city's eductors exclusively for catch basin cleaning, except for actual emergencies, and provide suitable equipment for pumping, flushing, and hauling water. (VIII 7d)

9. Eliminate two eductor crews and use the two eductors as spares for catch basin cleaning work. (VIII 7d)

10. Make time studies of several catch basin cleaning operations as a basis for the improvement of practices and the establishment of reasonable standards of performance. (VIII 7e)

11. Make efforts to have the two-man operation of eductors accepted by those concerned. (VIII 7f)

12. Develop and install a simple system of controlling and scheduling catch basin cleaning work, and as a part thereof, number each basin in some systematic method by location on streets and record the date of each cleaning. (VIII 7g)

13. Establish catch basin cleaning routes as a means of assigning and scheduling the work.(VIII 7g)

14. Require all eductors to remain in the field on or near their routes and to receive special orders by telephone. (VIII 7h)

15. Require the foreman to supervise closely the work of catch basin cleaning, and to develop a new routing plan so that on any day the crews are all working in the same section of the city. (VIII 7h)

16. Provide a suitable form for reporting the operations of the eductor crews and require the foreman of the work to review the reports daily for completeness and accuracy. (VIII 7i)

17. Provide pickup trucks for the two top bricklaying crews. (VIII 7j)

18. Eliminate the vacant positions of bricklayer and hodcarrier. (VIII 7j)

19. Make a cost analysis of equipment needs of the side sewer crews to include a cost comparison of several possible arrangements for transporting the side sewer crews.(VIII 7k)

20. Require the main sewer and side sewer repair crews to work until at least 4:30 p.m. before starting to clean up, and require the trucks to report and stop work one half hour later each day than the sewer crews. (VIII 7l)

21. Develop the monthly reports of sewer cleaning operations to show unit cost and production information and submit them to bureau officials as soon as practicable after the end of each month. (VIII 7m)

22. Institute and carry out a gas detection program to include periodic surveys of the sewers for gas detection, the instruction of employes in the use of protective equipment, and the use of ventilating equipment when necessary. (VIII 7m)

23. Maintain an operator at the Marina pumping station for one shift a day, seven days a week, and eliminate the second shift at this station. (VIII 7p)

24. Maintain a 24-hour a day, 7 days a week operation at the Commercial Street pumping station and use the operator from the eliminated shift at the Marina pumping station for the proposed third shift. (VIII 7p)

25. Discontinue regular shifts at the Park Merced and Sea Cliff #2 pumping stations and carry out necessary maintenance work at these stations by one operator on a roving assignment covering several stations, and eliminate one position of junior operating engineer. (VIII 7q)

26. Report complaint counts accurately each month by maintaining a consecutive daily count of all complaints. (VIII 7r)

27. Specify that the foremen of the bureau be on call regularly as a requirement for the positions and request that a reclassification be made on the basis of the additional duties. (VIII 7s)

28. Restrict the requirement to be on call regularly to the foremen in the bureau, and have the assistant superintendents subject to call only in cases of serious emergencies. (VIII 7s)

29. Develop a reporting system, by the several echelons of authority, to show information essential to the management of the bureau, submit monthly reports of the bureau's activities regularly, and prepare and make available the monthly reports within ten days after the close of a reporting period. (VIII 7t)

30. Maintain complete equipment cost records and prepare monthly summaries of equipment operation for bureau officials. (VIII 8b)

31. Discontinue the practice of using eductor crews to perform maintenance work on vehicles and carry out maintenance work by a central equipment agency. (VIII 8c)

32. Assign a reserve eductor to a crew whose regularly assigned eductor is in the garage for repairs or for preventive maintenance, and discontinue the practice of permitting crew members to remain with the eductor, while they are in the garage. (VIII 8d)

33. Revise the ordinances governing side sewer costs to permit the use of fixed charges for side sewer repair and installation. (VIII 9c)

34. Develop a schedule of fixed charges for the repair and installation of side sewers. (VIII 9c)

35. Bill the paving costs of side sewer repair work to property owners at rates representing the actual costs of that work, and reduce the present charge of $1.00 per square foot to the average fixed amount that will repay the city for the work performed. (VIII 9d)

36. Consider reducing the budget appropriation for the side sewer fund to approximately $50,000 annually. (VIII 9e)

37. Make an inquiry into the inspection charge for side sewer work and, if the item cannot be justified, drop the charge from the bills. (VIII 9f)

9. As to the Regulatory Inspection of Building Construction and Maintenance

The regulation of building construction and alteration is one of the important safety functions of the city and county government. It is a difficult function to administer because of the variety and complexity of the regulations it is responsible for enforcing. Under the circumstances, it is important that the policies, organization structure, and procedures of the agency of the city and county government responsible for this regulatory inspection function be made as clear cut and simple as possible, if efficient operation is to be obtained. In several respects the organization structure and the procedures in effect in the bureau of building inspection are unnecessarily complex. Supervision can and should be strengthened. The records of the bureau should be re-examined and a reporting system developed which will accurately reflect the activities of the bureau. The recommendations contained in this report are designed to correct existing inadequacies and to promote greater efficiency.

The bureau takes justifiable pride in rendering to the public prompt service. The attitude prevalent among all of the divisions of the bureau reflects the desire of bureau employes, not only to observe minimum building requirements, but to assure the home owner of high building standards. The efforts of the bureau in this respect are commendable and should be continued.

It should be noted that, as the inadequacies of the reporting system became apparent during the course of the study leading to this report, the bureau took steps at once to correct some of the shortcomings. The bureau has initiated a procedure for the review of building inspectors' daily reports and has revised its reporting system to show a complete breakdown of inspectional activity in the building division. The bureau has also taken steps to strengthen supervisory control over building inspectors through an analysis of the time spent on other than actual building inspection activity, with a view toward possible reductions. The bureau is commended for its attitude in correcting deficiencies and its willingness to accept suggestions for the improvement of its operations.

The recommendations expressed or implied on building regulatory services are summarized as follows:

1. Transfer the plumbing inspection function from the department of public health to the bureau of building inspection and create a plumbing inspection division. (IX 3b)

2. Relieve division heads of responsibility for office management and the supervision of the bureau's clerical personnel. (IX 3c)

3. Create an office services division under the supervision of a chief clerk responsible to the superintendent of the bureau. (IX 3c)

4. Make the office services division responsible for handling all clerical work of the bureau and for providing the necessary clerical services to all divisions of the bureau. (IX 3c)

5. Request that a reclassification of the positions in the boiler division be made as soon as is practicable and that a position of chief mechanical inspector be established. (IX 3d)

6. Develop a simple system of estimating comparative work loads in inspection districts as a means of making temporary adjustments and district revisions. (IX 3e)

7. Put into effect the recommendations contained in this report for changes in organization, names of divisions, and titles of division heads. (IX 3h)

8. Revise the reporting system of the bureau to provide an accurate and comprehensive account of the bureau's activities. (IX 4b)

9. Make a thorough review of the inspectors' daily reports to ensure their adequacy and completeness. (IX 4c)

10. Review the building inspectors' daily reports to provide an analysis of the time spent on activities other than actual inspection of buildings. (IX 4c)

11. Require the supervising construction inspector and the chief electrical inspector to spend a minimum of four hours a day on field supervision. (IX 4d)

12. Restrict the office hours of field inspection personnel to the period from 3:30 to 5:00 p.m. (IX 4e)

13. Eliminate one position of building inspector and one position of electrical inspector for regular district inspections as vacancies in these positions occur. (IX 4e)

14. Establish an inspectors' daily work file in the building division and require that all job cards not used any one day be kept in the office. (IX 4f)

15. Make a daily listing of job cards in use by each inspector in the building division by location in the approximate order of work. (IX 4f)

16. Revise the building code to require the bureau of building inspection to make inspections of refrigeration installations and of elevators not under the jurisdiction of the State, and to establish permit fees for these regulatory services. (IX 4g)

17. Make periodic appraisals of overhead line inspections to determine the necessity and advisability of continuing them on a specialized basis. (IX 4h)

18. Make an analysis of sign inspections by the building division and the electrical division with the object of consolidation and specialization within the electrical division. (IX 4i)

19. Develop a standard method of receiving, handling, and reporting complaints, requests for information, and special requests for inspections. (IX 4j)

20. Enlist the cooperation of other city bureaus and departments in referring suspected violations of the building and electrical codes to the bureau of building inspection. (IX 4k)

21. Develop and put into effect simple procedures for referrals and standard referral and reporting forms. (IX 4k)

22. Make efforts to explain to employes of other agencies what to look for in referring violations of the building and electrical codes. (IX 4k)

23. Revise the building and electrical codes to define exactly the responsibility of the bureau of building inspection for making periodic inspections of existing buildings to ensure compliance with the provisions of the codes. (IX 4l)

24. Revise the building and electrical codes to require the bureau of building inspection to make regular, periodic inspections of all places of public assembly, and specifically to state what buildings are to be considered as places of public assembly. (IX 41)

25. Improve the coordination of the divisions within the bureau of building inspection through staff conferences, consultative supervision meetings, and administrative studies. (IX 4m)

26. Make an analysis of the present distribution of automobiles to determine the comparative needs of each building and electrical district and to assign the automobiles to those districts having the greatest need for them. (IX 5a)

27. Reduce the three vehicles presently assigned to the engineering division, and the building inspector with half-time office duties to two, to be used on a pool basis. (IX 5a)

28. Use total operating unit costs of vehicles as the principal determining factor in replacing vehicles and discontinue the present policy of using mileage figures.(IX 5b)

29. Make a study to determine the net effect on revenues of adding certain desirable activities to the work of the building division and of putting into operation certain economies suggested in this report. (IX 6c)

30. Keep a close watch on the receipts from electrical permits and increase the fees if they prove to be too low to meet charter requirements. (IX 6d)

31. Revise the fees for boiler and pressure vessel installations as soon as possible, so that the total revenue from the service is at least equal to the total cost of application, review, and the inspection work. (IX 6e)

32. Make an analysis of the electrical sales revenues to determine whether or not additional inspection is necessary to carry out the intent of the regulatory provisions and, if no additional expense appears necessary, whether or not the fees should be reduced. (IX 6f)

10. As to Central Permit Service

To facilitate service to the public, a central permit bureau was established in 1932 to handle the clerical work of receiving building, building equipment, and street use permit applications, the issue of such permits, and the central cashiering for the department of public works. The concept of such a central permit and cashier bureau is sound, and the operating results have been fairly satisfactory. There are several areas in which the need for considerable improvement is evident.

A number of the provisions of the permit ordinance dealing with city-wide procedures are not being carried out. In each of these instances, more effective permit work will result if the provisions of the ordinance are observed. In this connection, the failure to follow consistently the section of the law dealing with certificates of occupancy may result in serious liability to the city and county. In the actual permit work itself, the central permit bureau has not been aggressive in recommending or adopting procedures which will provide the most effective permit service to the public.

The following recommendations on the central permit bureau, while proposing only a minor change in expenditure requirements, should provide improved central permit and cashiering operations and, ultimately, some reduction in expenditures for the overall permit procedures of the various city and county agencies concerned:

1. Instill in the officials concerned the importance of the public relations aspect of the bureau's work. (X 3b)

2. Continue the present organization plan of having one general office section and include in this section the office stenographer and the senior clerk responsible for house numbering. (X 3b)

3. Transfer the cashier in the electrical inspection division of the bureau of building inspection to the general office section of the central permit bureau and centralize the responsibility for handling the cash drawer of the bureau. (X 3b)

4. Provide that there be joint department examinations, as prescribed by ordinance, to determine cost of regulation and inspection. (X 3c)

5. As prescribed by ordinance, provide that there be regular meetings of representatives of departments concerned with permit matters for conferences with applicants on details of plans and specifications requiring alteration. (X 3c)

6. Reduce the bureau staff by one employe if there is some decline in permit work in the next few months. (X 3c)

7. Establish an effective control of in-process permit applications utilizing a preprinted routing form with perforated segments. (X 4c)

8. Either repeal or make effective at once the section of the permit ordinance dealing with certificates of occupancy.(X 4d)

9. Increase the amount of the cash deposit in connection with side sewer installations. (X 4e)

10. Substitute a simple form for the present fully-typed director's order. (X 4f)

11. Consider the issuance of permit books by the office of the controller to provide a greater degree of internal control. (X 4f)

12. Provide for yearly audits of the fiscal operations of the central permit bureau. (X 4f)

13. Develop a program, in conjunction with the bureau of building inspection, for the systematic disposal of old plans and specifications. (X 4g)

11. As to Accounting

Accounting for a large city department of public works not only involves the specialized aspects of governmental accounting but also includes many of the accounting requirements of private industry because it is necessary to develop current, usable cost data and management reports. It is important, for example, that the city and county authorities should know what public work can best be done by city forces, and what should be done by outside contract.

The present accounting operations of the department are being performed conscientiously but are seriously deficient in providing effective management accounting tools, an important accounting objective. Essentially, the bureau of accounts is performing routine clerical tasks, and the accounting positions in the bureau have been so classified. The operating bureaus have not recognized the need for the type of information that a strong and aggressive accounting department could provide.

The adoption of the following recommendations on public works accounting should provide a substantially improved and more extensive accounting operation with a definite reduction of at least $7,000 annually in expenditures as well as substantial, but more or less intangible, savings:

1. Centralize all accounting operations for the department at the corporation yard offices. (XI 3b)

2. Transfer the bureau of accounts' employes permanently assigned to record-keeping work in the operating bureaus to those bureaus, but retain functional supervision of those employes in the accounting bureau. (XI 3b)

3. Develop a manual of accounting rules and procedure.(XI 3c)

4. Reorganize the bureau of accounts into four sections, namely, general accounting and budgeting, cost accounting, internal audit, and machine services. (XI 3d)

5. Provide for a reclassification of accounting positions in the proposed bureau of accounting and finance that will recognize the importance of the accounting tasks to be performed. (XI 3c)

6. Revise the present attendance procedures in the maintenance bureaus and eliminate the daily time ticket. (XI 4b)

7. Abolish the three timekeeper positions. (XI 4b)

8. Develop a cost accounting system that will provide current, usable cost data. (XI 4c)

9. Include in the general allocation of cost burden all bureau of accounts expenditures as well as the salaries of all supervisory personnel in the department. (XI 4c)

10. Change the present procedure of allocating cost burden for the asphalt plant so that the burden will be charged directly to plant operations. (XI 4c)

11. Include depreciation of the asphalt plant as a factor of plant burden. (XI 4c)

12. Investigate the reasons for the difficulties in closing out work orders and review the problem with the office of the controller. (XI 4c)

13. Review the accounting procedures for interdepartmental building repairs with the office of the controller with the object of simplifying these procedures. (XI 4c)

14. Recognize the necessity of developing usable management reports and insist that these reports be provided by the accounting bureau and used intelligently by the operating bureaus. (XI 4d and 4e)

15. Undertake a study to determine the simplest and most effective material inspection and requirements procedure. (XI 4f)

16. Install punched card accounting machines to handle the bulk of the routine accounting work now being handled by manual methods. (XI 5a)

17. Investigate, in conjunction with the purchasing department, the reasons for the delay in placing public works purchase orders. (XI 6c)

18. Request the purchasing department to assign one of its employes as storekeeper at the Harrison Street pipe yard. (XI 6c)

12. As to Equipment Management

The department of public works uses 284 pieces of equipment in the conduct of its technical services and its maintenance and operation activities. Of this number, 235 automobiles, trucks, and maintenance machines are owned by the city, 34 are leased, and 15 are privately owned vehicles of department employes.

The equipment of the department is not managed in a positive and systematic manner to achieve economical equipment service for the department. This unsatisfactory situation is due in part to out-of-date city policies for the acquisition, retirement, and replacement of equipment, and to the failure to provide reasonable equipment reserves. Other causes are the lack of suitable preventive maintenance, the inadequacy of equipment cost records, and uncertainty as to the division of authority between the public works and the purchasing department.

The present divided responsibility between the public works and purchasing department must be corrected. Either the purchasing department should be made responsible for providing a complete equipment service, or the public works department should be given full control of its equipment so that it may establish a sound management system.

The recommendations expressed or implied on equipment management are summarized as follows:

1. Establish, in the administrative branch of the department of public works, a bureau of equipment management to be headed by an equipment manager directly responsible to the director of administration (assistant director of public works administration.(XII 4b)

2. Establish the following positions for the proposed bureau of equipment management: Equipment manager, equipment inspector, head equipment clerk, general clerk, and three positions of garageman. (Two of the latter positions would not be required if the purchasing department provides the regular daily servicing for equipment. (XII 4b)

3. Make the new bureau completely responsible for operating the department equipment system, for maintaining all equipment in good condition, for recommending replacement of equipment, for developing suitable equipment specifications, and for keeping complete and accurate records of the department; but have all equipment repairs made in the central shops repair service of the purchasing department according to precise bureau instructions; and maintain close liaison between the bureau and the repair shops. (XII 3b)

4. Adopt a preventive maintenance system to include the development of a systematic, scheduled inspection, and the regular inspection and repair of vehicles; and provide service outside regular hours to ready all vehicles for use every morning. (XII 4c)

5. Develop and install an equipment rental plan under which the bureau of equipment management would pay the cost of gasoline, oil, supplies, tires, repairs, servicing, and storage, and keep careful records of all items of expense; and would furnish the necessary equipment to using agencies at equitable rental rates. (XII 4d)

6. Establish a revolving account for the bureau of equipment management to which rentals would be credited and from which expenses for operation and maintenance would be paid. (XII 4i)

7. Make equipment assignments on a regular or part-time basis only after clear justification for such assignments has been made. (XII 4f)

8. When a reasonable amount of reserve equipment is available, establish an equipment pool for the intermittent assignment of trucks, automobiles, and certain other equipment, not regularly assigned. (XII 4g)

9. Develop an equipment records system designed to provide complete, accurate cost information for use in deciding many kinds of equipment problems on use, retirement, and replacement of equipment. (XII 3g)

10. Transfer chauffeurs and others employed on a piece of equipment, to other equipment or other work at the same time the equipment is sent to the repair shop; and discontinue the practice of permitting such employes to stay in the shop with the equipment. (XII 3c)

11. Consider providing or leasing a garage near the city hall for servicing automobiles, for providing temporary day parking space, and for providing night parking facilities for certain department equipment. (XII 3j)

12. Adopt a policy of providing sufficient equipment reserves so that department work can proceed at the normal rate even though some vehicles or machines of each class may be out of service for inspection or repair or because of accident; and acquire the reserve equipment and administer it as such. (XII 4e)

13. Adopt a definite policy regarding the retirement and replacement of equipment that will ensure the disposal of equipment when its economically useful life is ended; and adopt standard life spans for the various kinds and sizes of equipment on the basis of accurate cost data. (XII 3f)

14. Establish firm policies on equipment acquisition and replacement based on the development of factual proof of equipment needs subject to review and check by the budget review officials. (XII 3a)

15. Ensure that suitable equipment is acquired by making a thorough review of equipment specifications by the department operations and equipment specialists. (XII 3a)

16. Rent or lease equipment only after it has been demonstrated that such rental or lease will be cheaper and more practical than the purchase of such equipment. (XII 3h)

CHAPTER I

INTRODUCTION

1. General Statement

This report presents the findings, conclusions, and recommendations reached as a result of a detailed study of the policies, functions, organization, procedures, facilities, and expenditures of the department of public works of the City and County of San Francisco, and of its component bureaus. The department is one of the largest and most important branches of the city and county government, both in terms of the number of employes and of total expenditures. As of August 15, 1951, there were 1,458 employes actually in the service of the department, and an additional 67 positions are authorized by the current salary ordinance. The total expenditures of the department for the fiscal year 1950-51 were $7,444,691, of which $3,155,808 was for interdepartmental work (not in the regular department budget), and in addition about $14,000,000 was expended by contractors on public works improvement projects planned and supervised by the department.

The department of public works is one of the seven departments of the government of the City and County of San Francisco that are under the general direction of the chief administrative officer. The department is concerned mainly with the improvement, maintenance, cleaning, and use of streets; with the construction, repair, and operation of sewerage facilities; with the construction, repair, and operation of public buildings; with the inspection and control of private building work; and with miscellaneous engineering, inspection, and maintenance services to other departments.

2. Historical Background of the Department

In the early days of San Francisco, the functions and activities now entrusted to the department were performed under an elected superintendent of public streets, highways, and squares and a superintendent of public buildings. By 1900 the city had outgrown the early form and a new charter was adopted which created a board of public works to administer various public works and public utility matters. Four bureaus were established at that time, those of streets, engineering, building, and light and water. From 1900 to 1932 certain changes were made in the functions of the department and by the end of

this period, the number of bureaus had increased to seven, and included those of sewer repair, engineering, architecture, streets, building inspection, building repair, and accounts.

The board of public works continued in complete charge of public improvement, maintenance, and operation work until January 8, 1932, when the new charter was put into effect. At that time, the department of public works was created in its present form, the board of public works was abolished, and the director of public works, designated as the head of the department, succeeded to the powers and the duties of the board of public works, except that certain public utility functions were transferred by the charter to the public utilities commission.

3. Scope of the Report

The organization, functions, procedures, facilities, and expenditures of each bureau, division, and section of the department were reviewed in sufficient detail to gain a clear understanding of the present organization and of any problems, difficulties, or weaknesses that may exist. This report contains a complete review of the studies that have been made, detailed analyses of the facts disclosed thereby, conclusions drawn therefrom, and pertinent recommendations based on the findings and conclusions. It is divided into twelve chapters, with a chapter devoted to each of the nine bureaus of the department, one chapter to general administration, one chapter to equipment management, and one to introduction. The conclusions and recommendations are summarized in a separate part of the report.

Generally, inquiry was carried far enough to make it possible to reach firm conclusions and to present positive recommendations. In some cases, however, it was necessary to suggest that further study and research should be made, either because the required data or records were not available, or because a more extensive examination was necessary than was possible within the limits of this study.

Since the study covered the work of the department of public works only, an extensive review was not made of those few activities that are conducted by other municipal agencies, but that affect directly the proposed operations of the department. For example, neither the plumbing inspection work, now in the department of public health, nor that traffic engineering work in the police department which should be transferred to the public works department, was studied in detail. The general accounting, budgeting, purchasing, and personnel policies and procedures, that are conducted by other agencies, or that are prescribed by those agencies for the conduct of certain department activities, have not been studied in detail, and comments have been restricted to their effect on the work of the department.

4. The Study of Department Activities

The activities of each of the nine bureaus of the department were studied separately more or less as individual projects, after which a general examination was made of the overall administration of the department. In general, the actual field or office activities of a bureau were reviewed early in the study as a means of appraising the operations and of understanding some of the current problems of the unit, and insofar as it was possible to do, each job, project, crew, and operation was visited, sometimes with the supervisors and sometimes alone. The applicable laws, policies, and organization relationships were examined and pertinent follow-up explorations were made. A general inspection of the reporting and records systems and a rather detailed analysis of a portion of the reports was made in each bureau to gain a first-hand knowledge of comparative performance and unit cost of the work of the crews in various kinds of work. It was often desirable to make more extensive analyses of operations when suitable summary records were not available.

In each bureau, the observations in the field and office on the functions, organization, distribution of responsibility, and duties were compared with department charts and general activity reports and with the individual written statement of each employe, provided through the cooperation of the director of public works. Each discrepancy was discussed with the officials or employes concerned and an agreement was reached in each case as to the actual existing arrangements.

After general conclusions were reached on the activities of a bureau and tentative recommendations formulated, the proposals were reviewed with the municipal government advisory survey committee and with the representatives of the public works department.

CHAPTER II

GENERAL ADMINISTRATION OF THE DEPARTMENT

1. Introduction

This section of the report deals with the general administration of the department of public works, that is, with the top management for public works affairs (above bureau level) and the general office of the director. The work of each of the nine bureaus of the department is reviewed separately in subsequent chapters.

The general organization of the department will be discussed and suggestions for adjusting the structure and the unit and position designations will be made, after which the general personnel, coordination, reporting, and managerial direction and control aspects of administration will be discussed. In the second part of the chapter, the organization, procedures, and expenditures for the general office of the department will be reviewed.

2. The Direction of Public Works Activities

The general direction of the department is excellent. The management is capable, honest, intelligent, and professionally sound, and is apparently influenced solely by a desire to perform the public works services and operations as well and as economically as possible, and not at all by politics or group pressure. The discipline in the department is good.

The general policies of the department are, in general, definite and sound, and are well understood throughout the organization, although many of them are not available in written form. Some of the policies dealing with specific activities are sometimes not well understood. Very few of the policies are translated currently into written directives or orders that can be consistently enforced. The lack of an administrative manual is noted later in this report in connection with the absence of a clear-cut description of the organization, but is mentioned here because many of the established policies could well be outlined in such a manual for the guidance of supervisors and other employes.

There are indications that many decisions are continually being referred to top management that should, to the extent practicable, be made on a routine basis by subordinates. There are several reasons why this situation

prevails. The records of performance and cost of operations are often not available to the supervisor who should make certain decisions, or to any other employe; definite policies and orders on a particular matter may not be available; and suitable controls may not have been established to keep top management informed of action taken.

The lack of adequate supervision is mentioned as a major weakness in several of the chapters of the report that deal with operations, and is the cause of some lost effectiveness and economy. In some instances the regular supervisory officials spend so much time on office duties that they cannot devote sufficient time to ensuring that crews work effectively and in accordance with proper procedures and practices. In other instances there are not enough supervisory employes to ensure that field crews are kept usefully busy in the best performance of their duties. In a very few other instances, the supervisors may not be aware that good methods or work practices are not being followed. There are indications that budget requests for supervisory positions are denied regularly, possibly because the requests have not been adequately justified. Certain recommendations for added supervisory positions are made in various parts of this report when it is clear that the possible gains far exceed the cost.

No formal training scheme for new employes is in effect, but an effort is made to place untrained employes with experienced ones and to have supervisors instruct their subordinates, but it is clear that some more or less formal training is needed for supervisors and for certain classes of employes.

The current reporting of progress, performance, and cost of operations is one of the weakest management practices. Adequate detailed information is not available to help supervisors to administer their activities intelligently, and the reports that are made are so late as to be practically useless for management purposes.

3. The Organization for Public Works Direction

a. Present General Organization Structure: The public works department is headed by a director of public works, who is responsible directly to the chief administrative officer of the city for the administration of the public works functions and activities that are assigned to the department by charter, ordinances, or general statutes. The position is established by charter and is not under the civil service, but an incumbent holds the office at the pleasure of the chief administrative officer.

The department is divided into five major units as follows:

Administrative group
Bureau of engineering
Maintenance and operating group
Bureau of architecture
Bureau of building inspection

The head of each of the five units reports directly to the director of public works and all other positions in the department are subordinate to one or another of the unit heads, with the single exception of the position of engineering analyst which is immediately under the director of public works. The general organization plan and the annual payroll expense of each unit as of November 15, 1951, are shown in the following tabulation:

Name of Unit	Title of Head of Unit	No. of Employes Inter-depart-mental	Budget	Annual Payroll Cost
Department of Public Works	Director of Public Works		1	$ 15,000
Engineering analysis	Engineering analyst		1	6,540
Administration	Asst. director of public works for administration		1	8,700
Bureau of accounts	Supervisor		31	110,760
Central permit bureau	Supervisor		11	41,040
Personnel unit	Senior clerk		3	9,160
Secretarial unit	General clerk-stenographer		2	6,720
Minutes and orders	General clerk-stenographer		1	3,420
Telephone exchange	Chief telephone operator		6	18,714
Dept. doctor	Physician		1	4,500
Bureau of engineering	City engineer	130	129	1,481,877
Bureau of architecture	City architect	56	6	278,780
Maintenance and operation	Asst. director of public works for maintenance and operation		1	8,820
Bureau of street repair	Supt. of street repair	30	158	733,273
Bureau of sewer repair	Superintendent	126	6	566,149
Bureau of building repair	Supt. of maintenance and repair of public bldgs.	201	118	1,473,313

Name of Unit	Title of Head of Unit	No. of Employes Inter-departmental	No. of Employes Budget	Annual Payroll Cost
Bureau of street cleaning	Supt. of street cleaning	15	323	1,255,599
Bureau of building inspection	Superintendent		51	290,760
Totals		608	850	$6,313,115

b. Comments on the Present General Organization Plan: The general organization structure of the department is excellent, and parallels very closely an ideal arrangement that is frequently advocated for state and municipal public works departments, which provides for three main branches - administration, engineering or improvements, and maintenance and operation. In addition to these three, the city provides an architecture unit which can reasonably be separated from and placed parallel to an engineering unit, or might, in some instances, very well be joined to the latter unit; and a building inspection unit that properly is included in the public works department, but that does not fit well into any of the three main branches. It is desirable that an administrative analysis unit be separate from the main branches of the department and serve the director by making indpendent management or administrative studies or investigations. Such a unit should be established as a definite and integral part of the organization structure. It is consequently recommended that a small staff office be created in the department immediately under the director, that it be designated the office of management analysis; and that the office be headed by an administrative, engineering, or management analyst. The staffing needs of this office will be discussed in a subsequent section.

Very little attention has been given to the selection of names for the units of the organization and of titles for supervisory positions that are explanatory of the work of a unit or the duties of a position. Many organization groups in the department have no names whatever and many more do not have official names but have acquired certain designations through common use. Civil service titles are used almost exclusively in place of definitive administrative titles. Suggestions are made throughout this report for improving the names of units and the titles of positions. It is believed that these or similar designations should be officially adopted and used in all communications, orders, and procedures.

The grouping of maintenance and operation units to form a main branch of the department, and of the administrative units to form another branch has lead to some inconsistencies in the use of the designations of "bureau" and "division." If the names given to the first echelon under the assistant directors is to be bureau, as in bureau of accounts or bureau of street cleaning, then the same method should be followed in the engineering branch of the department. If the first echelon under the city engineer is to be a

bureau, as the bureau of design, and the bureau of construction, then another name must be found for the bureau of engineering.

The usual pattern of names for units in the city government is department, bureau, division, section, and unit in the order of descending authority. If this pattern is followed in the department of public works, the first echelon under the director would have to be labeled "bureau" and the names would be bureau of maintenance and operation, bureau of engineering, bureau of administration, and the like; and the second echelon would be division, as in division of design, division of accounts, and the division of street repairs. Either plan would be satisfactory, but the necessary changes should be made so that there is a consistent use of the title scheme adopted. The names have not been used in the charter so there should be little difficulty in making the changes. Inasmuch as there would be fewer changes by using "bureau" as the second echelon under the director, it is recommended that the name "branch" be used for the first echelon and "bureau" for the second echelon under the director of public works.

c. Staff for General Direction: The staff for the general direction of the department affairs may properly be considered to include the employes who report directly to the director of public works, but the positions of city engineer, city architect, and superintendent of the bureau of building inspection, are discussed in the chapters that deal with their bureaus. The remaining staff includes four employes as follows:

Position	No. of Positions	Rate of Pay Monthly	Annual Payroll Cost
Director of public works	1	$1250	$15,000
Asst. director of public works, administration	1	725	7,830[a]
Asst. director of public works, maintenance and operation	1	735	8,820
Engineering analyst	1	545	6,540
Totals	4		$38,190

a/ 90 percent of total salary - 10 percent shown with general office.

d. Proposed Plan of General Organization: The plan proposed for the general organization of the department is presented in the tabulation that follows:

Name of Unit	Title of Head of Unit
Department of Public Works	Director of Public Works
Office of management analysis	Management analyst
Administration branch	Director of administration
Engineering branch	City engineer
Operations branch	Director of operations
Architecture branch	City architect
Building inspection branch	Supt. of building inspection

The proposed internal organization of the branches is discussed in the chapters that follow. In addition to the present functions of the administration branch it is recommended, in a subsequent chapter, that an equipment management unit be created and placed in this branch.

e. Administrative Manual for the Department: Attention is called in several chapters of this report to the lack of a manual of organization or of written assignments of functions, duties, and authority. Because of this lack, there is some confusion as to the precice powers and responsibilities of the several bureaus, divisions, sections, units, and offices, and considerable uncertainty regarding the assignment of duties and responsibilities of a unit to positions in the unit. It is understandable that many employes, including some division and section heads, do not have a clear understanding of their place in the organization or of the relationships that exist among the various units of the department. A few units have written descriptions of the distribution of responsibilities and duties among the positions; also a few units have more or less adequate practice manuals, but these usually contain an inadequate explanation of the organization arrangements or omit any discussion of this subject.

Many cities have developed administrative codes that describe the entire municipal organization plan, define powers, responsibilities, and duties, and explain the relationships among the departments and agencies. The present charter of the City and County of San Francisco gives recognition to the desirabilit of an administrative code. Section 23 states in part, "The board of supervisors may enact and provide for the publication in printed form of an administrative code, which shall specify or detail the powers, duties, methods and procedure in the several departments and offices." No action, however, has been taken to provide such a code. The part of a municipal administrative code that deals with the department of public works should be developed as soon as practicable, preferably in such form that it may later be used as a part of the code for the entire city and county government. A manual should be provided and should contain a description of the organization plan of the department, and a statement of the functions, activities, powers, authority, and responsibilities of the department and of each component branch, bureau, division, section, unit, or other organization entity. In addition it should contain the general rules and regulations of the city and and of the department that define the administrative procedures governing working arrangements and conditions, hours of work, leaves, overtime, and a great variety of special instructions and orders relating to the conduct of the work of the department and the relationships with other units, with other departments, and with the public.

Such an administrative manual or code is normally intended to be of general interest to the whole department and will not ordinarily contain detailed operating procedures of the bureaus and divisions. The latter procedures, often called manuals of practice, may repeat advantageously some of the pertinent information from the administrative manual, but are primarily intended for a particular unit or kind of work.

It is recommended that an administrative manual be developed for the department of public works, preferably in loose leaf form; that it include a detailed description of the organization of the department, an explanation of the more important relationships among units and with other departments, and administrative procedures and methods. It is further recommended that practice manuals for bureaus or divisions, or for specific kinds of work, be provided, and that some central control over such regulations be maintained by the office of the director.

4. General Administrative Procedures

a. Personnel Policies and Procedures: To an unusual extent, the personnel policies and practices of the city and county affect adversely the efficiency and the accomplishments of the department of public works. Despite the great value of the civil service system to the department, and the general benefit that it has brought to the city and the employes alike, there are some weaknesses that rather seriously handicap the effective management of the public works department. Employes with a sufficiently high level of competence are not available in certain positions and cannot be made available under existing conditions and practices. Much of the difficulty stems from the failure to reclassify positions when major adjustments in duties and responsibilities are made. This is as much the fault of the department management as it is of the personnel administration. It is reported that employes best qualified for a particular position are often not permitted to take the examinations, or cannot pass the examinations that are given with a sufficiently high grade, to gain the appointment, with the result that a less competent person gets the appointment.

The supervisors of the department are at times forced to work employes out of class because they have to depend on the most able employes to do the important work, regardless of whether or not they have the appropriate rating.

The effort required to discharge incompetent, inefficient, and other employes who do not give an honest day's work for a day's pay is another source of difficulty that unfortunately is also experienced in other cities in which civil service regulations are in force. Although it was never intended that civil service procedures should protect incompetent and unproductive employes in the government service, it is reported that the procedures of the civil service commission have made it extremely difficult to discharge such employes. This is very damaging to the morale of the service.

Most of the remedial action needed to improve the personnel situation must necessarily be provided by the civil service commission, but the department can do its part by providing the commission with information regarding changes in responsibilities and duties in particular units or positions, and by requesting reclassification studies of units or positions.

b. Coordination of Department Activities: In general, the activities of the department are well coordinated. This is particularly true in the bureau of engineering, where the fullest use is made of specialist services and therefore duplicating and overlapping of activities is avoided, and where employes are shifted as necessary, thereby preventing unbalanced staffs. Coordination among the operating bureaus appears to be enforced by the director of public works and, more recently, by the newly appointed assistant director of public works, maintenance and operation, rather than by the mutual cooperation of the bureau supervisors. Coordination within the operating bureaus is generally satisfactory.

Staff meetings are not widely used by the management of the department, or by major bureaus, to induce coordination among component groups. Such staff meetings as are held by the director and by the assistant directors are organized and held to solve particular problems as they arise. This is one effective use of staff meetings that may merit extension when the director secures adequate personnel to make the necessary preparation for such meetings. Formerly, the director held regular staff meetings for the discussion of current problems, but the bureau heads who attended found very little to bring before the group and the meetings were deemed to be a waste of time and were abandoned. There has been no use or trial of consultive supervisory meetings as a device for reaching prompt administrative decisions and for dealing with current matters that may affect two or more agencies. It is believed that such meetings may be held beneficially by the director and by the heads of the three major branches of the department. The director's regular consultive staff meeting should always be attended by the heads of the administration and operations groups and by the city engineer, when engineering matters are on the agenda. Specialists in various fields should be called in when their participation or advice is needed. At the second echelon level, the city engineer, the head of the administrative branch, and head of the operations branch should hold meetings of bureau heads. Adequate preparation for staff meetings is essential to secure successful results, and detailed agenda should be prepared and participants carefully selected. Executives should have assistance in preparing for meetings.

One of the main purposes of consultive supervisory meetings is to secure joint agreement on procedures, methods, and administrative actions of various kinds. The participation of subordinate supervisors in reaching decisions concerning the management of the department or branches is highly desirable, and should be fostered to the fullest possible extent.

c. Reporting at the Department Level: Public works reports for the director, for city officials, and for the public are not particularly well developed. Some of the regular reports are not properly designed to show plainly the progress, performance, and unit cost for the various activities.

The annual reports of the department have much merit and give an excellent review of the department's work. The engineering section of the report is generally much better than the part dealing with the operating units, although unit cost information is omitted from all sections. Issuance of the annual reports is delayed as much as six months after the close of a fiscal year, mainly due to delay in producing cost figures and accounting summaries for the year's work.

Current interest in a report issued so late is probably small, and a valuable opportunity to improve public relations is lost. From a historical viewpoint, the reports are valuable, but a report that has only historical significance may not justify the cost of printing. It is recommended that the annual reports be developed and distributed as promptly as practicable, but in any case not later than three months after the close of each fiscal year.

Generally the reporting on current operations is weak, although reports are prepared in considerable numbers, and numerous references are made in the subsequent chapters of this report to the need for current administrative reports of operations that will keep the branch, bureau, and division heads informed on the details of progress, performance, and cost of the various activities, and that will provide concise summaries of this information for the director, the chief administrative officer, and other interested officials. The recommendations with regard to operating reports should be put into effect as soon as practicable. The summary reports should be designed to give the director the information that he needs for effective control in as direct and concise a manner as possible. The whole system for reporting, analyzing, and summarizing current public works information on progress, performance, and cost should be redesigned throughout, so that adequate data are reported and so that prompt, informative, weekly and monthly statements are provided.

d. Administrative and Engineering Analysis: Administrative and operations analysis work in the office of the director is now performed by one employe, an engineering analyst. A large part of his time for the past few months has been devoted to the preparation of material for the annual report of the department for 1950-51, so many projects and studies have had to be deferred. Actually, the work to be done is much more than one employe can handle, and certain desirable projects, analyses, and administrative services for the director and the assistant directors have to be left undone.

An administrative analysis or management staff unit in the office of the director is urgently needed to assist the director in the making of analyses, tests, and investigations that form an important part of the controls essential to the positive and intelligent direction of a large department.

It was recommended in a preceding section that an office of management analysis be created in the office of the director of public works. Such a unit should be manned to make the necessary review of administrative reports submitted to the director; to make suitable analyses and summary reports of performance and cost data; to keep historical comparative records of performance and cost; to make special investigations and studies for the director of methods, practices, and equipment; to make the necessary preparation for regular and special staff meetings and to report on such meetings; to register and publish the standard procedures or regulations for the department as they are officially approved by the director; and to review and edit proposed procedures and regulations that are submitted by the branches for the approval of the director; and to carry out the general administrative work assigned

by the director. Normally, the unit should not conduct technical engineering studies nor conduct research studies in materials and operations processes. As a minimum, the unit should consist of a management analyst, who would be the head of the unit, an administrative analyst, and a statistical clerk. It is believed that such a unit will soon demonstrate its merit through actual improvement in the work, resulting in savings in cost. It may be desirable at the outset to provide professional management assistance in the development of a comprehensive and effective system of public works records and to develop the first administrative and practice manuals and procedures, but after such help the unit should be able to carry on satisfactorily.

e. Public Works Complaints: Complaints by the public concerning services rendered by the department, the condition of public works structures or installations, or other matters that are directly the concern of the department, are discussed in several sections of this report. Generally it has been found that complaints to the department are promptly investigated and the causes corrected, but that almost no administrative use is made of the complaint information. In many instances there is no written report on the investigation or the corrective action taken, and ordinarily there is no control over complaint procedure to insure that necessary action is taken. It is assumed by the officials that all complaints will be taken care of promptly, regardless of whether or not they are reasonable, and there is justification for this assumption since complaints are usually given priority attention as a matter of policy. The work of some maintenance services is controlled and assigned by the complaints received rather than on a positive, programmed basis.

Many public works and similar government units use the information received on complaints to assist in the administration of the maintenance services by reporting the number of justified complaints on each service, and often on each route, district, or kind of work. After a good complaint recording system is established, executives find clues of numerous kinds to neglected, ineffective, badly performed maintenance and operating services, and often are able to improve conditions through such complaint information study.

The basis of an adequate complaint reporting system is a simple written report on the findings of the investigations, and on the action taken, and a simple tickler control is used to make sure that all complaints are answered and reported. Several different kinds of forms and procedures are used effectively in cities throughout the country, but, essentially, the good systems require complaints to be recorded on a suitable form, usually in duplicate, by whoever receives them. One copy is routed to the inspector who makes the investigation and then to the foreman who is assigned to do any work that may be needed; but often a foreman does both the investigation and any required work. The other copy is sent to a central control point and filed temporarily until a report of investigation and action is received, and then is placed in the permanent files. The reports of the investigation are made on the original report form, noting, first, whether or not the complaint is justified, and then, what action should be taken. The reports of action taken are also noted on the report form, and the reports are initialed by the inspectors and the foremen concerned before they are forwarded to the central complaint office.

It is recommended that an improved system for reporting the investigation and action on complaints be adopted and installed by the department, and that the records of justified complaints for the various services be utilized to discover weak points in the work of the department.

5. The General Office of the Department

a. Functions and Activities: General administration functions and activities of the department are combined with certain activities of the director's office to form the general office of the department. The principal functions of this office are as follows:

1. Providing secretarial and office services to the office of the director.

2. Maintaining central personnel records for the department.

3. Preparing minutes, hearing records, and director's orders.

4. Operating the principal city hall telephone exchange.

5. Verifying illness reports, of employes absent from work, by means of personal visits of a physician.

b. Present Organization and Staff of the General Office: The general office is composed of a number of organization units, the heads of which report to the assistant director of public works for administration. The number of positions assigned to each unit as of November 15, 1951, and the annual payroll cost are shown in the tabulation that follows:

Name of Unit	Title of Head of Unit	Number of Positions	Annual Payroll Cost
Office of the director	Asst. director-admin.	1	$ 870[a]
Secretarial unit	General clerk-stenographer	2	6,720
Personnel-city hall unit	Senior clerk	3	9,180
Minutes and orders unit	General clerk-stenographer	1	3,420
City hall telephone exch.	Chief telephone operator	6	18,714
Department doctor unit	Physician	1	4,500
Totals		14	$43,404

a/ Estimated 10% of time of assistant director for administration.

It is desirable to retain the general organization plan now in effect but several units should be combined as suggested later in this chapter.

The tabulation that follows shows the positions assigned to each unit in the general office as of November 15, 1951, and the annual payroll cost:

Position	Number of Positions	Rate of Pay	Annual Payroll Cost
Assistant director of public works for administration	1	$725	$ 870 a/
General clerk-steno. (secretarial unit)	1	285	3,420
General clerk-steno. (secretarial unit)	1	275	3,300
Senior clerk	1	350	4,200
General clerk-typist	1 b/	225	2,700
Office assistant	1	190	2,280
General clerk-steno. (minutes)	1	285	3,420
Chief telephone operator	1	325	3,900
Telephone operator	2	302.50	7,260
Telephone operator	2	275	6,600
Telephone operator (part-time)	1	79.50	954
Physician (part-time)	1	375	4,500
Totals	14		$43,404

a/ Estimated 10 percent of time of assistant director for administration
b/ Position vacant with duties being performed by employe temporarily assigned from bureau of accounts.

The secretarial unit, consisting of two general clerk-stenographers, provides the necessary secretarial service to the director, the two assistant directors, and the engineering analyst.

The specific activities of the city hall personnel unit may be summarized as follows:

1. Maintaining central personnel records for the department.

2. Notifying the civil service commission and the office of the controller of department personnel changes.

3. Processing new employes of the bureaus of architecture and building inspection, the central permit bureau, and the general office.

4. Distributing paychecks and handling miscellaneous routine personnel matters for these four agencies. The handling of these matters for the other bureaus of the department is discussed elsewhere in this report.

5. Operating a system of inter-office mail pickup and delivery for the department.

The preparation of departmental minutes, hearing records, and director's orders is handled by the minutes and order unit, consisting of one general clerk-stenographer.

The principal city hall telephone exchange is operated by the department of public works. The exchange is headed by a chief operator.

The department employs a physician on a part-time basis. It is the duty of this physician to make, on the day reported, a house call on each department employe who reports that he is unable to work because of illness, and to certify as to the legitimacy of the illness claim.

c. Comments on the Organization of the General Office: The organization arrangement of the secretarial unit is most satisfactory and should be continued, inasmuch as the time of both employes is used to best advantage and, in the absence of one, the other employe is familiar with all of the secretarial details of the director's office. As suggested elsewhere in this chapter, the general clerk-stenographer responsible for department minutes and orders should be transferred to this unit.

Civil service rules and regulations for the city and county are exceedingly complex. In a large public works department which, by the nature of its work, tends to have a substantial personnel turnover, it is necessary that there be an organization unit that is completely familiar with these rules and regulations. Also, it is highly desirable that continual technical staff assistance on other personnel matters be available, not only to public works management, but to employes of the department themselves. These personnel activities are now being handled by the public works officials who are burdened with many other matters, while the small city hall personnel unit is engaged almost entirely in work of a routine clerical nature. It is recommended that the functions of this unit be expanded to include interpreting civil service rules and regulations for the department, drafting letters and memoranda for the review of the assistant director for administration, and serving generally as the reference point for personnel matters in the department.

The minutes and order work is a necessary activity and should logically be included in the secretarial unit because of the nature of the work and because the inclusion will provide a more flexible staff arrangement for the director's office. It is recommended that the general clerk-stenographer handling the minutes and order work be transferred to the secretarial unit.

The concept of a central city hall telephone exchange is sound from an efficiency viewpoint, and a strong case can be made for having a central city and county exchange to provide service for a number of other public buildings of the city and county as well as the city hall. Actually, there has been a tendency in recent years to set up additional exchanges in the city hall itself. At the present time there are six telephone exchanges in the city hall, located as follows:

Assessor's Office
Attorney's Office
Superior Court
Municipal Court
Public Utilities Commission
Central City Hall Exchange

It is difficult to justify six separate exchanges in the city hall from the viewpoint of either efficient service or economy. It certainly requires more employes to operate six separate exchanges. It can be argued that better service is provided by an individual exchange able to render more specialized service to the public. This argument is not convincing since citizens, in many instances, call the city hall central exchange number and are told that another number must be called to reach the desired agency. Further, if decentralization were carried to its logical extreme, every department and many bureaus would have their own exchanges. It is recommended, therefore, that one telephone exchange serve the city hall. It is further recommended that the department of public works make a study of the telephone requirements of other city and county buildings to determine what exchanges in other buildings can be incorporated in the central exchange in the city hall. In such a study, the department should consider the elimination of its own switchboard at the department yard.

The practice of having a physician follow up illness reports has worked very satisfactorily and should be continued. The work of the physician is intimately connected with other personnel activities of the department. It is recommended, therefore, that the physician position be attached to the personnel unit.

It is recommended in Chapter III that the clerical work involved in advertising for bids and processing proposals and contracts be transferred from the bureau of engineering to the administrative office of the department. The head clerk should be assigned to the general office of the department and be made immediately responsible to the assistant director of public works for administration.

d. The Proposed Organization of the General Office: The proposed plan of organization for the general office is presented in the following tabulation:

Name of Unit	Title of Head of Unit
General Office	Director of administration
	(Assistant director of public works, administration)
Contract control office	Head clerk
Secretarial service	Secretarial supervisor
Personnel office	Personnel officer
Central telephone exchange	Chief operator

This plan embodies the recommendations made in this chapter. It will be noted that some changes are proposed in the names of some of the units and in the titles of certain supervisors. These proposed titles are for administrative purposes and civil service titles do not necessarily have to be changed although the change would be desirable in some instances. It is recommended that the organization plan outlined above be put into effect as soon as practicable, and that the names and titles shown in the tabulation be adopted.

e. Secretarial Procedures in the Office of the Director: The office of the director handles an amount of paper work which places a substantial load on the secretarial staff of the office. Recommended procedures contained elsewhere in this report should reduce the amount of detail that must be reviewed and acted upon by the director and his immediate assistants and, consequently, should reduce somewhat the secretarial workload.

The present method of filing in the office is satisfactory. The secretarial staff itself has recognized the need of installing a simple card system as a reference on referral correspondence which will be more flexible and will save some time over the present system. The referral card system can be used to advantage in other bureaus of the department, and it is recommended that a uniform procedure be established for the department.

A simple filing manual should be developed for the department as a whole and should be prepared in the office of the director, after consultation with the bureaus. It is recommended that such a manual be prepared.

f. Minutes and Director's Orders: A number of record-keeping practices have been retained in the department after the abolition of the public works board in the 1932 charter revision. Minutes of weekly meetings conducted by the director, or the assistant director in his absence, and formal director's orders as a result of these meetings, are typical of these records. Because of the nature of the work of the department, it is

necessary that the director's order procedure be retained but it should be simplified. While some form letters are now used for director's orders, the use of forms can be considerably expanded with some saving in clerical and typing time. It is recommended, therefore, that the order procedure be reviewed and a system of forms be developed.

g. City Hall Telephone Exchange: The city hall telephone exchange is located in the basement of the city hall. The quarters are not satisfactory in that the telephone exchange room is dingy and the lighting is poor. Higher employe morale will result if these conditions are remedied, and it is recommended that this be done.

The chief operator has requested that another telephone operator be added to her force because of the volume of work and so that she can be freed for at least a portion of the day from the switchboard to handle supervisory matters. The chief operator's request has merit under present circumstances. However, the sensible approach is to consolidate all city hall telephone exchanges into one central exchange as previously recommended. This will provide adequate staff to handle the central operations, will save about $10,000 a year over the present costs of operating six separate exchanges, and will enable the chief operator to devote time to supervisory matters.

Judged by the telephone company's periodic checks, the quality of service of the city hall telephone exchange appears to be satisfactory. Control over long-distance calls is satisfactory.

h. Department Physician: The department's physician telephones the department in the late morning of each working day to obtain the names of employes who have not reported for work because of illness. He makes a house call on each such employe to determine whether the employe is actually ill, and he makes a report regarding the employe on an individual form to the department. The physician's report is the basis for granting sick leave, leave without pay, or for taking disciplinary action. The procedure is working satisfactorily and no changes are recommended other than the addition of the physician's preliminary diagnosis on the form. The diagnosis was formerly recorded by the physician and would be of value if compensation questions arise later tin connection with an employe's absence.

6. Expenditures for General Administration

The expenditures for general administration for the fiscal years 1949-1950 and 1950-1951 and the budget for 1951-1952 are reported as follows:

	Expenditures 1949-1950	Expenditures 1950-1951	Budget 1951-1952
Permanent salaries	$60,854	$70,168	$82,234
Temporary salaries	1,099	1,375	1,598
Contractual services	10,354	10,568	3,350
Materials and supplies	5,272	3,815	4,880
Equipment	125	2,084	120
Totals	$77,704	$88,010	$92,182

The increase of the budget over the previous year's expenditures is due to an increase in salaries and to added positions.

CHAPTER III

ENGINEERING

1. Introduction

The bureau of engineering, one of the most important branches of the department of public works, performs technical engineering services in connection with the city's streets and sewerage systems. As of November 26, 1951, there were 309 employes in the bureau, of whom 129 were in permanent budget positions and 180 were in interdepartmental (nonbudget) positions. The number of employes varies generally with the workload and actually the number of positions authorized for the current year is 371, of which 161 are budget positions.

Prior to 1900, the engineering services were provided by the various agencies concerned, but mainly by the superintendent of streets, highways, and squares, and the superintendent of public buildings. In 1900, the bureau of engineering was created under the new board of public works to bring together the technical engineering activities. It has remained substantially the same since that time, but certain responsibilities relating to municipal utilities and public buildings have been transferred to other agencies. In particular, the water supply, airport, and street railway engineering work is now performed by the public utilities commission, and architectural services by the bureau of architecture.

The bureau provides high grade technical engineering services in accordance with the best accepted practice. As far as can be determined, there is no political interference with technical findings and engineering decisions.

The main work of the bureau is planning and designing street, highway, traffic, sewer, and sewage treatment improvements, and supervising construction and reconstruction work. In addition, however, the bureau provides engineering services to other municipal agencies, particularly in

the structural, surveying, electrical, mechanical, and hydraulic engineering fields. It also maintains and cares for the engineering maps, plans, and records of the city.

2. General Functions and Activities of the Bureau

The bureau of engineering is responsible for planning the construction, reconstruction, and major maintenance of streets, highways, bridges, viaducts, sewers, and sewage treatment plants, and for the operation of the sewage treatment plants. It carries out the following general functions and activities:

a. Preparing plans and specifications for major thoroughfares, streetcar track removal, pavement reconstruction and resurfacing, and original street improvements to be financed by abutting owners.

b. Designing and preparing plans and specifications for street and sewer structures, for main sewers, and for sewage treatment plants.

c. Preparing plans and specifications for traffic control devices, channelization, parking, and bus stops; and determining traffic routing during construction work.

d. Granting permits for street improvements, spur tracks, street excavations, and street use.

e. Reviewing street and sidewalk condition, ordering repairs made, inspecting the work done in city streets, checking on encroachments and special street use, and investigating damage claims.

f. Making preliminary and construction surveys for improvement projects, investigating and reporting on street openings and closings and on new subdivision streets, and maintaining street maps and records.

g. Preparing contract documents and exercising control over contract payments and final acceptances.

h. Supervising the painting of traffic markings on pavements and the installing of traffic control signs, parking meters, and pavement zones.

i. Supervising and inspecting all public works projects constructed by contract, and testing materials and mixtures used on construction and maintenance work.

j. Operating the city's sewage treatment plants, and making studies of industrial wastes and of shore conditions.

3. General Organization of the Bureau

a. Present Organization Structure: The bureau of engineering is headed by the city engineer who is appointed by, and holds office at the pleasure of, the director of public works. The bureau now has six main divisions and two staff units as shown in the following tabulation:

Name of Unit	Title of Head of Unit	No. of Positions	Annual Payroll Cost
Bureau of engineering	City engineer		
Office of city engineer	City engineer	2	$ 15,180
Div. of streets & highways	Asst. city engineer	32	172,512
Div. of design	Senior engineer, civil	69	382,680
Div. of surveys and mapping	Engineer, civil	34	138,100
Div. of traffic engineering	Engineer, civil	22[a]	105,300
Div. of construction	Engineer, civil	58	290,100
Div. of sewage & waste treat.	Senior engineer, civil	70	287,525
Programs and budgets division	Vacant	3	16,380
Administration division	Engineer, civil	19	74,100
Totals		309	$1,481,877

a/ Includes three employes assigned to police department.

Not all of the positions shown are permanent budget positions. Actually, excluding sewage treatment operation positions, 59 are budget positions and the other 180 are called interdepartment positions and are authorized subject to the availability of funds from sources outside the regular budget. All sewage treatment plant operation positions are budget positions. The distribution of the budget and interdepartment positions is shown in the following tabulation:

Unit	Positions Occupied November 26, 1951		
	Budget	Inter-department	Total
Office of the city engineer	2	0	2
Division of streets and highways	14	18	32
Division of design	14	55	69
Division of surveys and mapping	17	17	34
Division of traffic engineering	0	22	22
Division of construction	3	55	58
Division of sewage and waste treat.	70	0	70
Programs and budgets division	1	2	3
Administration division	8	11	19
Totals	129	180	309

Each of the divisions is headed by a supervisor who is responsible directly to the city engineer. The assistant city engineer is the head of one of the divisions (streets and highways) and in addition performs certain adminis-

trative activities as assigned by the city engineer, but he normally exercises direction over other divisions of the bureau only in the absence of the city engineer.

The units of the bureau are definitely named and the names appropriately describe the nature of the work performed. The titles of the supervisors, however, are those of the position classes established by the civil service commission, and administrative titles generally describing the supervisory responsibilities have not been adopted. It is believed that the adoption and use of administrative titles of supervisory positions provides a desirable means of identifying these employes in orders, procedures, and correspondence, and results in a better understanding of the organization, both by its employes and by the people who have dealings with the bureau.

In general, the basic organization plan of the bureau is good. The division of the work is by activity and process which is generally accepted as most suitable for large engineering groups. There are one or two points of broad organization of the bureau, however, that require comment.

At present, the city engineer has to direct the activities of the eight branches of the organization practically alone, and in addition has to make many technical decisions, develop plans and programs for future work, and deal personally with the public, contractors, and other city agencies. The work is believed to be much too heavy for a single individual, and it is a distinct credit to the incumbent that the large program is conducted at the present high level. It is inevitable under the circumstances that the emphasis has to be put on the day to day problems of designing and constructing current improvements, and that other aspects of the city's engineering work may be given too little attention. For example, very little consideration is given to maintenance and operating procedures of the other bureaus of the department, almost no research into methods, procedures, and materials is possible, and too little time is available for the technical and administrative planning of engineering work. It is believed that the work of the bureau should be so organized that the city engineer has at least half of his time available for office and field review of the work being performed, and for planning future bureau work. The assistant city engineer should be relieved of his duties as the head of a major division of the bureau and be assigned a definite part of the work of directing and administering the engineering work. The division of the work between the city engineer and his assistant will depend on individual preferences, but it would be logical to assign to the assistant city engineer the work of directing and supervising the administrative routines of personnel, purchasing, contract, budget preparation and control, contract control, assessments, inspections, permit authorization, and most of the dealings with other municipal departments.

There seems no good reason to separate street design from the main designing unit. At present the street work is organized on a functional basis while the rest of the designing and construction of improvements is arranged on a process basis. It is believed that the designing and planning

of pavement and highway improvements should be merged with the division of design, and that the inspection, permit, assessment, and investigation work of the division of streets and highways should be placed in other service units.

The modified plan of organization to give effect to these recommendations would result in the establishment of five staff or service units instead of the present two, and would provide five line units instead of six. The suggested plan is presented in the following tabulation:

Name of Unit	Title of Head of Unit
Bureau of Engineering	City engineer
Staff units	Assistant city engineer
Contract control	Contract engineer
Permit and inspection	Permit and inspection engineer
Assessment	Assessment engineer
Plans and budgets	Plans and budget engineer
Administrative services	Office manager
Division of design	Engineer of design
Division of surveys and maps	Engineer of surveys and maps
Division of construction	Engineer of construction
Division of traffic engineer	Traffic engineer
Division of sewage and waste treatment	Engineer of sewage treatment

It is recommended that this plan be put into effect. The details of the plan will be discussed in subsequent sections. If the city engineer has to devote as much as fifty percent of his time to public meetings and conferences, to conferences with the director of public works, to coordination of work with other bureaus and departments, and to general planning, the assistant city engineer should be given stronger direct administrative control over the line divisions.

The internal organization and staffing of the divisions and units of the bureau will be presented in the sections immediately following. For each division, the present organization plan and the present staffing will be given, and any weaknesses or possibilities for improvement will be discussed. The recommendations for the internal organization of such unit will include the proposed names of units and appropriate administrative titles for each supervisor.

4. Office of the City Engineer

The immediate office of the city engineer consists simply of the city engineer and his secretary.

	No. of Positions	Rate of Pay Monthly	Annual Payroll Cost
City Engineer	1[a]	$1,000	$12,000
General clerk-stenographer	1[a]	265	3,180
Totals	2		$15,180

a/ Permanent budget position.

The secretary, in addition to providing stenographic and receptionist services for the city engineer, does some typing for the assistant chief engineer and other engineers, and handles some minor clerical duties. This office service may be somewhat thin, but it is believed that the remedy lies in strengthening the administrative sections of the bureau and of the department rather than in increasing the office staff. However, in the proposed plan, a secretary is also assigned to the assistant city engineer. The proposed arrangement for the city engineer's office includes the city engineer, the assistant city engineer, and two secretaries.

5. Division of Streets and Highways

a. Functions and Activities: The street and highway design, planning, and control is included in a major branch of the bureau known as the division of streets and highways. Specifically the division conducts the following functions and activities:

(1) Designing and planning freeway, major street, and highway improvements, and developing specifications for the pavement part of projects.

(2) Preparing plans and specifications for projects that involve the removal of abandoned streetcar tracks and the reconstruction or resurfacing of the pavements.

(3) Preparing plans, specifications, and line and grade diagrams, for streets to be constructed under private contract or under special assessment proceedings, and maintaining records of original pavement projects.

(4) Preparing plans for street maintenance projects and for sidewalk improvements.

(5) Inspecting pavements and sidewalks to discover failures or misuse, reviewing applications for permits for special street use, making investigations and inspections in connection with encroachments, street use permits, and excavation permits, enforcing the repair of defective sidewalks, and investigating claims of any type made against the department.

(6) Coordinating special assessment procedures, preparing special assessment documents, spreading assessments, and generally supervising assessment proceedings.

The first four activities listed above are purely designing and planning activities, and it is suggested that they should be included in the division of design and thereby bring all of that type of work together in a single organization unit. The other activities involve mainly inspection and service work and are not ordinarily assigned to a design unit, although there would be no objection from the point of view of sound organization to creating a permit and inspection division. It has been recommended, however, that this work be handled by a service unit in a staff capacity.

b. Organization and Staff: The division of streets and highways is headed by the assistant city engineer who is responsible directly to the city engineer. The division contains four main sections as shown in the following tabulation:

Name of Unit	Title of Head of Unit	No. of Positions	Annual Payroll Cost
Division of street & highways	Asst. city engineer	1	$ 9,600
Street improvement section	Engineer, civil	1	7,800
Permit inspection unit	Asst. engineer II, civil	7	33,012
Assessment unit	Asst. engineer II, civil	2	12,480
Design unit	Asst. engineer II, civil	2	12,000
Highway section	Engineer, civil	9	47,340
Track removal section	Engineer, civil	7	36,840
Plan and record section	Engineer, civil	3	13,440
Totals		32	$172,712

The staff of the division, showing the number of employes actually working in the division by position and salary, is shown in the following tabulation:

Position	No. of Positions	Rate of Pay Monthly	Annual Payroll Cost
Asst. city engineer	1[a]	$800	$ 9,600
Engineer, civil (major highway)	1	625	7,500
Asst. engineer II, civil	1[a]	530	6,360
Junior engineer, civil	3	400	14,400
Junior engineer, civil	1	380	4,560
Draftsman, civil	2	370	8,880
Senior draftsman, civil	1	470	5,640
Engineer, civil (track removal)	1	650	7,800
Asst. engineer II, civil	1	570	6,840
Draftsman, civil	1	410	4,920
Junior draftsman	1	310	3,720
Draftsman, civil	1	410	4,920
Draftsman, civil	1	410	4,920
Junior draftsman	1	310	3,720
Engineer, civil (street improve.)	1[a]	650	7,800
Asst. engineer II, civil (assess)	1[a]	570	6,840
Senior draftsman, civil	1	470	5,640
Asst. engineer II civil (plans)	1[a]	570	6,840
Draftsman, civil	1[a]	430	5,160
Asst. engineer II, civil (inspect)	1[a]	550	6,600
Junior engineer, civil	1[a]	440	5,280
Inspector, p.w. construction	1[a]	390	4,680
Inspector, p.w. construction	1[a]	381	4,572
Inspector, p.w. construction	3[b]	330	11,880
Engineer, civil (plans	1[a]	650	7,800
Senior draftsman	2[c]	470	5,640
Totals	32		$172,512

a/ Permanent budget positions
b/ Two permanent budget positions
c/ One permanent budget position

Under the proposed plan of organization, the highway section, the track removal section, the plan and record section, and the design unit of the street improvement section would be transferred to the division of design. A total of 22 present employes would be so shifted. The other positions would form the proposed assessment and permit and inspection service units.

The division is inadequately housed. The sections and units are separated, and one section is housed in two separate places. All the units are crowded. The general space problem will be discussed in a subsequent section, but the effect on organization and staffing and on supervision and

coordination of the work of the division is of interest here. The effectiveness lost through inconvenience, inadequate working conditions, and physical separation is not determinable but it is appreciable and costly. The greater supervisory effort needed under such conditions could be put to better use if space conditions were improved.

There are indications that some activities of the division are undermanned. Under present procedures, several phases of the inspection program are inadequate to provide proper protection to the city government, but the solution may lie, in part at least, in the correction of procedures rather than in providing more inspectors. The inspection of utility trenches and of street condition will be discussed in another section of this chapter. It would appear that the inspection of sidewalks is undermanned and that the pavement design work is behind schedule. No evidence of overmanning was found.

6. Division of Design

a. Functions and Activities: The division of design is responsible for designing and for preparing plans and specifications for sewers, sewage treatment facilities, structures, electrical work on traffic control and lighting, and high pressure water system improvements. Specifically, the functions and activities may be stated as follows:

1. Designing main sewers for collecting sanitary and storm sewage, including new sewers, relief sewers, intercepting sewers and outfall sewers; and preparing plans for sewer construction and reconstruction projects.

2. Designing bridges, foundations, retaining walk tunnels, underpasses, viaducts, and other structures; and preparing plans for structural projects or for structures involved in other projects.

3. Designing sewage treatment plants and preparing plans for the construction or improvement of treatment facilities.

4. Preparing plans for electrical work for traffic signal, street lighting, and other projects.

5. Preparing plans for mechanical work on departmental projects and also for other departments.

6. Preparing plans for improvements in the high pressure water system of the city.

7. Developing specifications for all sewer, structural, sewage treatment, electrical, and mechanical projects, constructed by contract.

8. Preparing estimates of quantities and cost for all projects.

9. Maintaining records of surface and underground water conditions, and records of underground structures and foundation conditions.

10. Reviewing plans for new subdivisions, particularly for sewerage facilities and underground utilities improvements.

11. Inspecting existing structure and sewers, and proposing maintenance programs.

The division does all of the designing and the preparing of plans, specifications, and estimates for all department projects except for pavement and certain traffic control improvements. It performs considerable design work for other city departments especially for work involving structural, mechanical, and electrical engineering. It has been proposed in a preceding section that the street and highway design work now performed by the division of streets and highways be merged with the division of design.

b. Organization and Staff: The division of design is headed by a senior engineer, civil, who is responsible directly to the city engineer. The division comprises seven sections as shown in the following tabulation:

Name of Unit	Title of Head of Unit	No. of Positions
Division of design	Senior engineer, civil	1
Administrative section	Engineer, civil	8
Sewer section	Engineer, civil	6
Sewage disposal & mech. section	Engineer, civil	1
Civil engineering unit	Asst. engineer II, civil	13
Mech. engineering unit	Asst. engineer II, mech.	12
Structural section	Engineer, civil	10
Electrical section	Engineer, electrical	14
Underground structure section	Senior draftsman, civil	2
Specifications section	Engineer, civil	2
Total		69

The 69 positions in the division as of November 26, 1951 are listed by title and the amount of compensation is shown in the tabulation that follows:

Position	No. of Positions	Rate of Pay Monthly	Annual Payroll Cost
Senior engineer, civil (design)	1[a]	$750	$ 9,000
Engineer, civil (administrative)	1[a]	650	7,800
Senior draftsman, civil	1	450	5,520
Senior draftsman, civil	1	470	5,640
Junior draftsman	1	350	4,200
Draftsman, civil	1[a]	430	5,160
General clerk	2[b]	225	5,400
Senior draftsman, civil	1[a]	470	5,640
Engineer, civil (sewers)	1	650	7,800
Asst. engineer II, civil	2[a]	570	13,680
Asst. engineer II, civil	1	530	6,360
Senior draftsman, civil	1	470	5,640
Draftsman	1	430	5,160
Engineer, civil (sew.disp.& mech.,	1	650	7,800
Asst. engineer II, civil	1	530	6,360
Senior draftsman, civil	1	470	5,640
Draftsman, mech.	1	410	4,920
Draftsman, civil	1[a]	370	4,440
Asst. engineer I, civil	1[a]	465	5,580
Senior draftsman, civil	1	470	5,640
Cartographer	1[a]	370	4,440
Jr. draftsman	1[a]	330	3,960
Draftsman, civil	1	430	5,160
Asst. engineer I, civil	1[a]	465	5,580
Senior draftsman, civil	1	470	5,640
Draftsman, civil	1	390	4,680
Asst. engineer, civil	1	550	6,600
Office assistant	1	190	2,280
General clerk-stenographer	2	285	6,840
General clerk-stenographer	1[a]	225	2,700
Asst. engineer II, mech.	1[a]	550	6,600
Asst. engineer II, mech.	1	530	6,360
Jr. engineer, mech.	1	420	5,040
Jr. engineer, mech.	1	380	4,560
Senior draftsman, civil	1	425	5,100
Draftsman, mech.	1	430	5,160
Draftsman, civil	1	390	4,680
Draftsman, mech.	1	370	4,440
Engineer, civil (structural)	1	650	7,800
Engineer, civil	1	650	7,800
Asst. engineer II, civil	1	570	6,840
Asst. engineer II, civil	2	550	13,200
Asst. engineer II, civil	1	530	6,360
Senior draftsman	1	470	5,640
Junior engineer, civil	1	440	5,280
Junior engineer, civil	1	380	4,560
Draftsman, civil	1	370	4,440

a/Permanent budget position
b/One permanent budget position

Position	No. of Positions	Rate of Pay Monthly	Annual Payroll Cost
Engineer, electrical	1	$650	$ 7,800
Asst. engineer II, elec.	1	570	6,840
Asst. engineer II, elec.	1	510	6,120
Asst. engineer I, elec.	1	465	5,580
Asst. engineer I, elec.	1	490	5,880
Junior engineer, elec.	1	380	4,560
Draftsman, civil	1	430	5,160
Draftsman, elec.	1	430	5,160
Draftsman, civil	1	390	4,680
Asst. engineer II, elec.	1	570	6,840
Asst. engineer I, elec.	1	465	5,580
Senior draftsman, civil	1	470	5,640
Junior engineer, elec.	1	380	4,560
Junior draftsman	1	310	3,720
Senior draftsman, civil (undergr.)	1[a/]	470	5,640
Draftsman, civil	1	430	5,160
Engineer, civil (specifications)	1	650	7,800
Asst. engineer II, civil	1[a/]	570	6,840
Totals	59		$382,680

a/ Permanent budget position
b/ One permanent budget position

It may seem at first glance that the present organization plan is arranged partly according to activity, and partly according to skill required, but this impression comes from the names given to the units, rather than from the actual division of the work. The arrangement is almost entirely by skill or technical field. The sewer section, for example, is essentially a hydraulic engineering group.

The present span of command is not too great for a unit engaged almost exclusively in technical engineering work in offices, but it should not be extended beyond seven sections and, if changed, should be reduced rather than increased.

c. Proposed Organization for Design: If street design activities are merged with the division of design as recommended in this report, the organization should be adjusted and certain work combined so that not more than seven supervisors report directly to the head of the division. The following plan is proposed:

Name of Unit	Title of Head of Unit
Division of design	Engineer of design
Design coordination section	Design coordination engineer
Administrative unit	Office supervisor
Estimating unit	Estimate engineer
Specifications unit	Specifications engineer
Structural design section	Structural design engineer
Sewer section	Engineer of sewers
Sewer design unit	Sewer design engineer
Underground structures unit	Underground structures engineer
Mechanical & sewage treatment design section	Mechanical design engineer
Highway design section	Highway design engineer
Major street design unit	Asst. highway design engineer
Track removal unit	Track removal engineer
Street design section	Street design engineer
Pavement design unit	Pavement design engineer
Plans and records unit	Pavement records engineer
Electrical design section	Electrical design engineer

The functions and activities of the proposed organization are the same as those of the present division of design plus the design activities of the division of streets and highways, items one to four inclusive of section 5a of this chapter.

It would normally be desirable to put all street design work under one section rather than the two shown, but, due to the limited number of engineering classes and the difficulty of maintaining the classification of the supervisors, it is believed that two street sections should be established at the present time. It is recommended that the plan be adopted.

Three of the sections (structural, electrical, and mechanical and sewage treatment design) are located in a separate building at 45 Hyde Street, about two blocks from the city hall where the other sections are housed. The space provided in the Hyde Street building is adequate, but that in the city hall is not satisfactory. The space in the city hall is crowded and is not well suited or arranged for the best control or for effective work. Meetings with the public often have to be in a room in which several engineers may be working, which is unsatisfactory both for the visitors and for the design employes. Space used by the sewer design section is particularly inadequate. New quarters should be found for the design unit to provide good working conditions and to simplify the supervision of the work.

7. Division of Surveys and Mapping

a. Functions and Activities: The responsibility for making preliminary, construction, and property surveys, and for maintaining official maps of streets is placed in a separate unit of the bureau called the division of surveys and maps. The activities of the division may be summarized as follows:

(1) Making preliminary surveys for street and sewerage projects, and when requested, for other departments.

(2) Making construction surveys to stake out improvement projects and to determine final quantities.

(3) Preparing right-of-way maps to be used as the basis for acquiring property needed by the city.

(4) Making surveys of properties to be acquired by the city.

(5) Reviewing and checking proposed new subdivision street layouts, and reporting on the investigation of such subdivisions.

(6) Making surveys, reports, and investigations on street openings and closings.

(7) Making studies of street grades and recommending street grades for establishment as official and approved grades.

(8) Preparing and maintaining official street maps of the city.

(9) Making precise control surveys and establishing permanent benchmarks.

The division is generally considered to be the official surveying agency of the city government and actually does most of the property, street, and project surveying work. Certain other departments, particularly the public utilities commission and the recreation and park department, however, have their own surveying units.

b. Organization and Staff: The division of surveys and mapping is normally under the supervision of a civil engineer who is responsible directly to the city engineer, but at the present time the incumbent is on extended sick leave, and the work of the division is being supervised by two assistants. The division consists of an office group and seven survey parties, but there can hardly be said to be an internal organization plan. Each of the six members of the office group and each chief of party reports directly to the division head, a total of 13 employes who report to the engineer in charge and are supervised by him. In the absence of the head of the division, the work is supervised jointly by an assistant engineer II and a chief of party (on office assignment). For the most part, the chief of party supervises the field parties and the assistant engineer II supervises the office staff and handles the technical phases of the property surveys and the street opening and closing work.

The staff of the division is shown in the following tabulation:

Position	No. of Positions	Rate of Pay Monthly	Annual Payroll Cost
Engineer, civil (surveys) [d]	1 [c]	$625	$ 7,500
Asst. engineer II, civil [e]	1 [b]	550	6,600
Chief of party [e]	1 [a]	465	5,580
Jr. engineer, civil	3 [b]	440	15,840
Draftsman, civil	1 [a]	370	4,440
Chief of party	1 [a]	385	4,620
Instrumentman	1 [a]	370	4,440
Surveyor's field asst.	2 [c]	270	6,480
Chief of party	1	465	5,580
Instrumentman	1	310	3,720
Surveyor's field asst.	2	270	6,480
Chief of party	1	465	5,580
Instrumentman	1	310	3,720
Surveyor's field asst.	2	270	6,480
Chief of party	1 [a]	440	5,280
Instrumentman	1 [a]	370	4,440
Surveyor's field asst.	2 [a]	270	6,480
Chief of party	1 [a]	465	5,580
Surveyor's field asst.	1 [a]	295	3,540
Surveyor's field asst.	2	270	6,480
Chief of party	1	465	5,580
Instrumentman	1 [a]	310	3,720
Surveyor's field asst.	1 [a]	295	3,540
Surveyor's field asst.	1	270	3,240
Chief of party (temporary)	1	385	4,620
Instrumentman (temporary)	1	310	3,720
Instrumentman [f]	1	310	3,720
Totals	34		$138,100

[a] Permanent budget position
[b] Two permanent budget positions
[c] One permanent budget position
[d] On sick leave
[e] Jointly directing division work
[f] On loan to construction division

The division is lightly manned in comparison with similar operations in other large cities. The relatively small survey staff is made possible by the present practice of requiring construction engineers and maintenance units to do most of the minor surveying jobs connected with their work. Instead of using full survey parties to replace construction stakes and to determine occasional grades or lines, instruments are furnished to some resident engineers so that these employes can do minor surveying jobs. Similarly the engineers in the bureau of street repair do most of the staking and surveying work needed in connection with pavement and sidewalk repairs. This method of relieving the survey division of the necessity of making frequent trips to do minor survey jobs is excellent. The cost to the city would be very much greater if survey parties had to do all this work. Under the circumstances, the parties can concentrate on the more important staking and survey work.

c. Proposed Organization for Surveying and Mapping: Under the present arrangement the head of the division has a tremendous supervisory burden, and, in addition, he has personally dealt with the more technical jobs of preparing property descriptions, street opening and closing transactions, and other work requiring a high degree of surveying and mapping experience and ability. This unsatisfactory organization plan should be corrected immediately. A new plan is proposed which provides for two main sections as shown in the following tabulation:

Name of Unit	Title of Head of Unit
Division of surveys and maps	Engineer of surveys and maps
Map section	Maps engineer
Surveys section	Chief surveyor
Field party (7)	Chief of party (7)

The map section should be made responsible for preparing right-of-way maps for property acquisition, for reviewing subdivision layouts, for preparing maps on street openings and closings, for preparing property descriptions, for preparing and maintaining street maps of the city, and, generally, for doing all the computing, investigating, reporting, and mapping work of the division.

The surveys section should be made responsible for all the field surveys of the division including precise, preliminary, construction, property, street, and special surveys, for programming and scheduling survey work, for making assignments to parties, for supervising the field work, for training surveyors in methods and procedures, and for developing and maintaining a suitable records system for survey notes. The head of the surveys section should devote a substantial amount of his time to field supervision.

d. Assignment of Surveying Employes to Parties: An effort is made to assign employes to parties so that each party is well balanced and so that personality conflict is minimized. It is not easy to build up parties that function well on varied assignments and it is made still more difficult by the present high rate of turnover in certain surveying positions. It is quite impossible for the supervisor to take into account also the budget status

of the various employes. In consequence, the 17 regular budget positions are scattered through five of the parties. Two parties have no budget employes at all and only one has all budget employes.

The time of a party should be charged as a unit since the group is almost always working on the same project and job. The time charges for mixed budget and non-budget parties must necessarily be in error for many jobs because the time of budget employes cannot now be charged to interdepartment work. It is understood that the time of budget employes, working on interdepartment work, is charged to a budget account, thereby destroying the validity of both the budget and interdepartmental accounts. This situation should be corrected, preferably by making it possible to charge an employe's time to a budget or interdepartmental account in accord with the way his time is spent. The time of non-budget employes who work on budget work is charged to a special budget account, which is satisfactory.

e. Turnover of Surveying Employes: The turnover in certain surveying positions is unreasonably high. It is reported that it is impossible to attract qualified candidates to these jobs because such applicants are paid more for the same work in private employment. The chiefs of party all report that party effectiveness is kept at too low a level by the use of untrained employes, and that the work is thereby made more difficult for the rest of the party.

In the last two months, three out of a total of thirteen surveyors' field assistants (Position F-604) have been replaced. Actually, 11 of the 13 employes are on the lowest pay step for the class. It is reported that the situation is much the same for the position of instrumentman, and five of the seven instrumentmen are at the entrance step. It is recommended that the pay of these positions be studied in relation to comparable employment on private work, and that the compensation for the positions be fixed at an adequate level.

8. Division of Traffic Engineering

a. Functions and Activities: The division of traffic engineering now has the duty of analyzing and interpreting traffic information and, on the basis of such data, of planning and designing traffic operational facilities. It also supervises the maintenance of traffic lines, signs, and signals. Specifically the division engages in the following activities:

(1) Making traffic and parking surveys, securing data on traffic accidents, analyzing and interpreting the information obtained.

(2) Designing traffic operational facilities on the basis of the traffic data secured, and recommending the installation of necessary structures or devices.

(3) Making studies of pedestrian traffic and sidewalk capacity, making recommendations for improvements, and investigating restrictions in normal sidewalk space.

(4) Supervising the painting of traffic lines and bus and safety zones, the installation of traffic signs, parking meters, and street signs, and the maintenance of traffic signals.

(5) Designating temporary traffic routes when streets are blocked by street or underground construction or maintenance work.

(6) Investigating and reporting on traffic accidents that result in damage to city property.

While the activities listed above are now conducted by the division, it is not at all clear just where the responsibility for these duties lies. Some of the responsibility lies definitely in the police department and actually there is some serious duplication and overlapping of duties between the bureau of traffic engineering and administration of the police department and the division of traffic engineering of the department of public works. The board of supervisors has given tacit approval to the present activities of the division of traffic engineering by approving budget appropriations for the division. Actually, some of the important engineering work is done by the division and sent to the police department for approval. The division of authority for this traffic engineering should be reviewed thoroughly and resolved as soon as possible, so that the authority and responsibility for each aspect of traffic control and traffic engineering is clearly and specifically allocated to a single agency. This matter will be discussed further in a subsequent section.

b. Organization and Staff for Traffic Engineering: The division of traffic engineering is headed by a civil engineer who is responsible directly to the city engineer. The division contains three sections as shown in the tabulation that follows:

Name of Unit	Title of Head of Unit	No. of Positions	Annual Payroll Cost
Division of traffic engineering	Engineer, civil	1	$ 7,800
Coordinating section	Asst. engineer II, civil	5	22,800
Design section	Asst. engineer II, civil	5	23,820
Operations section	Asst. engineer II, civil	8	34,740
Total division		19	$ 89,160
Assigned to police dept.	Engineer, civil	3	16,140
Total traffic employes		22	$105,300

This plan of organization is entirely satisfactory for the present level of operations. There is a real need for the coordinating section in order to develop mutually acceptable plans and actions with other agencies interested in traffic matters, including the police department, the municipal transit system, the design, street, and construction divisions of the department, and the schools. It should also deal with citizens' groups and the public generally and should promote traffic education in all division activities.

The design section should develop plans and specifications for signals, channelization, parking facilities, and special operational facilities. It should also conduct traffic investigations and studies, make timing studies, and conduct research into traffic control facilities and devices. Ultimately, it may be desirable to establish a separate section for making traffic surveys.

The operations section should supervise the installation and maintenance of traffic signs, stop signs, signals, and devices, and the painting of lines, zones, and signs; and should check the timing of signals.

The staff of the division is shown in the following tabulation:

Position	No. of Positions	Rate of Pay Monthly	Annual Payroll Costs
Engineer, civil (traffic)	1	$650	$ 7,800
Asst. engineer II (coordinating)	1	510	6,120
Jr. engineer, civil	1	440	5,280
Jr. draftsman	1	330	3,960
Jr. draftsman	2	310	7,440
Asst. engineer I, civil (design)	1	465	5,580
Jr. engineer, civil	1	400	4,800
Jr. engineer, civil	1	380	4,560
Draftsman, mechanical	1	430	5,160
Jr. draftsman	1	310	3,720
Asst. engineer I, civil (maintenance)	1	465	5,580
Draftsman, civil	2	430	10,320
Draftsman, civil	1	390	4,680
Jr. draftsman	1	350	4,200
Jr. draftsman	1	330	3,960
General clerk-stenographer	1	275	3,300
General clerk-stenographer	1	225	2,700
Totals for the division	19		$89,160
Engineer, civil (police dept.)	1	650	7,800
Sr. draftsman, civil	1	470	5,640
General clerk-stenographer	1	225	2,700
Grand totals	22		$105,300

The three traffic employes assigned to the police department are on the payroll of the bureau of engineering and their salaries are paid from gas tax money as are those of other employes of the division of traffic engineering. Neither the city engineer nor the head of the division of traffic engineering exercizes any direction or supervision over the three employes.

c. The Place of Traffic Engineering in the Municipal Government: Traffic engineering is a relatively recent municipal activity and has not yet found an accepted place in the organization pattern of city government. Various arrangements have been tried in different cities and the latest studies of the problem give some indication that a satisfactory national solution is emerging.

The placement of traffic engineering in the municipal governmental structure has been especially difficult because its functions and activities cut across those of basic established municipal agencies. Traditionally the enforcement of traffic laws and regulations has been in the police department, and the planning and construction of street use and street structures has been under the public works department, and both departments have fundamental interests and duties in the control of traffic. The problem then becomes one of examining each of the various phases or activities of traffic control and of determining the proper allocation of each, so that a clear line can be drawn between the responsibilities and authority of the police department and those of the public works department. Regardless of the definition of this line, there will still have to be effective coordination of the work of the two agencies. Obviously the creation of a new department or agency to administer traffic engineering activities is not the answer to the problem, because such a unit would have to coordinate its work with two important agencies, rather than one, and would have to deal with the police authorities on the enforcement of traffic regulations, and with the department of public works on the use of the streets for traffic operational facilities.

In San Francisco, the efforts to delegate responsibility and authority on traffic have been piecemeal, incomplete, and, in a measure, conflicting. The responsibility and authority for traffic engineering is divided among five municipal agencies - police, public works, public utilities, planning, and electricity. The present arrangement is illogical in many respects. The charter, in a sentence, makes the police department responsible for the regulation of traffic including the location and use of control devices. A recent charter amendment authorized the creation of a bureau of traffic engineering and administration to regulate street traffic, to promote traffic education, to collect, analyze, and interpret traffic data, to analyze accident data, to engage in traffic research and planning, to review the design of traffic facilities, and to participate in street design and operation projects with regular municipal agencies. Much of the authority and responsibility apparently granted is questionable because of a statement in the amendment that, "The powers and duties of the traffic director hereinabove stated shall not modify to any extent the powers and duties of any department or office but shall be, first, for the purpose of assisting the police commission in its regulation of traffic, and second, for the purpose of recommendation only, to other departments or offices upon matters within their jurisdiction, but affecting to any extent the regulation of traffic."

There is general agreement that a traffic engineering agency is needed to provide the basic data and the scientific engineering planning for traffic controls. Such a unit should serve both the police and the public works group, but the engineering facilities should not be duplicated. Instead, close cooperation should be established between the two agencies so that joint basic policies may be agreed on, and so that coordination on all matters of mutual interest may be assured.

Recent studies more or less agree that the traffic engineering unit should be placed in a public works department so that it may have the benefit of competent technical direction, and so that the basic decisions with regard to street use may be readily made and approved. For example, the President's Highway Safety Conference Committee on Engineering recommended that, "in cities having more than 100,000 population, a traffic engineering unit be established, comparable in authority and influence to other major divisions of a department of public works or corresponding organization." This plan has been adopted successfully in Philadelphia, Detroit, Seattle, Dallas, and Chicago, among other cities.

The model traffic ordinance, as revised and approved by the National Conference on Street and Highway Safety in 1946, has received national acceptance and actually has been adopted in whole or in principle by many cities. It provides for a traffic division in the police department and for a city traffic engineer. The division of authority is shown by the following quotations from the model ordinance.

> "Sec. 20. Duty of traffic division. - It shall be the duty of the traffic division with such aid as may be rendered by other members of the police department to enforce the street and traffic regulations of this city and all of the State vehicle laws applicable to street traffic in this city, to make arrests for traffic violations, to investigate accidents and to cooperate with the city traffic engineer and other officers of the city in the administration of the traffic laws and in developing ways and means to improve traffic conditions, and to carry out those duties specially imposed upon said division by this ordinance and the traffic ordinance of the city.
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> * * *
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> "Sec. 28. b. It shall be the general duty of the city traffic engineer to determine the installation and proper timing and maintenance of traffic control devices, to conduct engineering analyses of traffic accidents and to devise remedial measures, to conduct engineering investigations of traffic conditions and to cooperate with other city officials in the development of ways and means to improve traffic conditions, and to carry out the additional powers and duties imposed by the ordinances of the city."

It is recommended that the powers and duties be established in San Francisco in substantial accordance with the intent and provisions of the model traffic ordinance and that the traffic engineering duties be placed in the division of traffic engineering in the bureau of engineering of the department of public works. It is further recommended that the charter be amended as soon as practicable to correct any provisions that may be in conflict with the proposed distribution of authority on traffic control, and that suitable legislation be enacted by the board of supervisors to define the traffic control powers, duties, and responsibilities of the police department and the department of public works.

9. Division of Construction

a. Functions and Activities: The supervision and control of construction of public works improvements is placed in a major branch of the bureau of engineering called the division of construction. The functions and activities of the division may be summarized as follows:

(1) Supervising and inspecting the improvement work performed by contract to see that the provisions of the plans and specifications are carried out in all respects and that the interests of the city are protected.

(2) Reviewing necessary contract changes and recommending for approval the changes found to be desirable and proper; working out tentative agreements with contractors, and making recommendations on extras and on extensions of time.

(3) Reviewing estimates of quantities and cost of work done, and approving them for payment.

(4) Making final inspections of projects, reviewing final quantities and amounts, specifying further work to be done, if this is necessary, and recommending projects for acceptance.

(5) Laying out work for contractors, and providing line or grade stakes as necessary.

(6) Making physical and chemical tests of materials and products used by contractors on construction projects; testing materials and supplies used in the maintenance and operating activities of the department; and doing testing work for other departments.

(7) Inspecting garbage and rubbish disposal operations to see that the ordinance provisions on such activities are carried out.

b. Organization and Staff for Construction Supervision: The division of construction is headed by a civil engineer who is responsible directly to the city engineer for the work of the unit. There is no continuing plan of organization in effect, but the groups are organized and reorganized to meet the requirements of the construction projects currently being supervised. Groups may be rather large for the supervision of large and complicated projects, while others may be very small. Many projects are supervised by a single resident engineer or inspector, and two or more very small projects may be inspected by one engineer.

Two of the employes of the division are used as supervisors. One normally supervises the very small jobs and private work and has two men with him; the other, at the present time, is giving particular attention to watching

the closing of several contracts. On November 26, 1951 the 57 employes were assigned as follows:

Assignment	No. of Employes
General supervision	1
Supervisor - completion jobs	1
Broadway tunnel	10
North point treatment plant	6
Southeast treatment plant	3
Sludge plant	3
Stanley Drive viaduct	3
Mission Street viaduct	1
O'Farrell track removal	4
Ocean Avenue track removal	2
Clemente track removal	1
Second Street repaving	3
Wordside Avenue widening	1
Apparel City high pressure system	1
Marin Street sewer	1
Golden Gate Park crossover	2
Public Works yard	1
Third Street and Mission Street signals	1
Otis Street and Mission Street signals	1
Midtown Terrace sewer	1
Private construction	3
Total field supervision	50
Office work - final estimates	1
Laboratory	2
Total assigned to supervision	53
Loaned to other agencies	3
Military leave	1
Off duty	1
Total	58

The 58 staff positions are shown in the following tabulation:

Position	No. of Positions	Rate of Pay Monthly	Annual Payroll Cost
Engineer, civil (construction)	1[a]	$600	$ 7,200
Asst. engineer II, civil	1	550	6,600
Jr. engineer, civil (B'way tunnel)	1	440	5,280
Asst. engineer II, mech.	1	530	6,360
Jr. engineer, civil	1	440	5,280
Jr. engineer, civil	1	400	4,800
Jr. engineer, civil	4	380	18,240
Draftsman, civil	1	370	4,440
Instrumentmen	1[c]	310	3,720

Position	No. of Positions	Rate of Pay Monthly	Annual Payroll Cost
Asst. engineer II,mech.(N.Pt.plant)	1	$530	$ 6,360
Asst. engineer II, elect.	1	530	6,360
Asst. engineer I, mech.	1	440	5,280
Jr. engineer, civil	1	420	5,040
Jr. engineer, civil	1	400	4,800
Jr. engineer, elect.	1	400	4,800
Asst. engineer II, civil	1	570	6,840
Asst. engineer II, elect.	1	570	6,840
Asst. engineer I, civil	1	510	6,120
Asst. engineer I, civil	1	490	5,880
Asst. engineer I, civil	3	465	16,740
Asst. engineer I, elect.	1	465	5,580
Asst. engineer I, civil	2	440	5,280
Asst. engineer I, civil	1	440	5,280
Asst. engineer I, civil	1[b/]	425	5,100
Jr. engineer, civil	4[c/]	440	21,120
Jr. engineer, civil	5	400	24,000
Jr. engineer, mech.	1	400	4,800
Jr. engineer, civil	9	380	41,040
Jr. engineer, elec.	1	400	4,800
Jr. engineer, elec.	1	380	4,560
Inspector, P.W. const.	2	390	9,360
Inspector, P.W. const.	2	330	7,920
Jr. draftsman	1[a/]	330	3,960
Engineering chemist, (laboratory)	1	510	6,120
Inspector, P.W. const.	1	350	4,200
Totals	58		$290,100

a/ Permanent budget position.

b/ One budget position attached to bureau of sewer repair and one inter-departmental position loan to highway district No. 10.

c/ Loaned from division of surveys and mapping.

c. Promotion for Construction Supervision Employes: The construction supervision employes have great difficulty in gaining promotions. Many cannot pass the examinations for the higher classes of the professional service, and it is therefore very difficult to retain the experienced construction personnel. Qualified construction supervisors are in great demand at the present time and employes can secure much higher paying positions with private engineers and contractors. One result of the inability to promote qualified construction engineers is that several of the best employes have to work out of their class. For example, the most important project now being constructed is supervised by a junior engineer, whereas there are 17 assistant engineer positions in the division and, actually, one of the assistant engineers is subordinate to the junior

engineer on the project. The division supervisors do not like to assign engineers to do work out of the class in which they are employed, but in the best interests of the city, and for the good of the division, they feel obliged to use the best men on the most important work.

The civil service commission now considers only broad engineering classes, and a civil engineer, for example, must be competent to be assigned to structural, hydraulic, transportation, sanitary or highway design, research, or construction work indiscriminately and to pass an examination in any or all of these fields. Such a practice is rather common in other governments for the lower classes of the professional field, but is very unusual in the higher brackets. Ordinarily, specific jobs in the higher professional categories are filled on the basis of unassembled examinations under which the qualifications of candidates are rated for a specific kind of work. The City of San Francisco does not use the unassembled examination method which is unfortunate, but if such a method cannot be employed, then some consideration should be given to the utilization of narrower classes. Specifically, the construction employes, at least, should be examined separately from design and planning engineers. If necessary, the lines of promotion may be restricted to construction or operating positions.

The large turnover in the construction supervisory forces is due partly, at least, to the poor future prospects for construction supervision employes. Recruits soon see that the most competent resident engineers cannot gain promotion through experience as construction supervisors, and it is understandable that they request transfers, or leave to work for private companies. It is reported that a total of 23 field men have left the division since the first of the year, which is a very high rate of turnover.

It is recommended that a study be made of the positions in the construction supervision service and that a means be found to recognize resident engineering proficiency, either through holding unassembled examinations, or through establishing special classes of positions for resident engineers.

d. Proposed Internal Organization: The lack of a definite plan of internal organization for the division does not appear to be adversely affecting the work, except that a very heavy supervisory load is placed on the head of the division. Some method of assigning jobs to two or three general supervisors should be adopted if the work load of the division stays at the present level. One of the most satisfactory plans is to assign the work on a geographical basis - not necessarily on a fixed area plan - but to assign reasonably equal loads to the supervisors as nearly as practicable in the same general area. Another plan would be to divide assignments according to kind of projects - street, sewer, structural, signals, and the like.

It is recommended that consideration be given to the utilization of two or three engineers as general supervisors, and that several projects be assigned to each general supervisor for detail supervision and training on the basis of geographical grouping or of kind of projects.

10. Division of Sewage and Waste Treatment

a. Functions and Activities: The division of sewage and waste treatment is responsible for the operation of the three sewage treatment plants and one sludge plant of the city, and for the control of industrial wastes. Specifically the division conducts the following activities:

(1) Operating three sewage treatment plants and a sludge plant in such a manner that the effluent discharged into the ocean or the bay is inoffensive, in accordance with the requirements of the state health department.

(2) Maintaining the structures, machinery, and yards at the sewage treatment plants.

(3) Testing the sewage at various stages of the treatment processes to supply necessary operational information and to determine plant performance.

(4) Planning and conducting research in methods and in operating practices as a means of improving the effectiveness of the operation and reducing the cost of the work.

(5) Making studies of the character and strength of industrial wastes from processing plants and making recommendations for the correction of unsatisfactory conditions.

(6) Investigating shore waters and shore conditions as an index of the proper operation of plants and of the control of industrial wastes.

(7) Making periodic inspections of the Hassler Health Home sewage treatment plant, the county jail sewage treatment plant, and the activated sludge plant of the park department, and recommending operating and maintenance action as may be found desirable.

At the present time, the Richmond Sunset plan is in operation and preparations are being made to test the two new treatment plants and the sludge plant and to begin operation. The crews for the new plants are being recruited and trained. Some of the employes are helping in the completion and testing of the plants.

b. Organization and Staff for Sewage and Waste Treatment: The division of sewage and waste treatment is headed by a senior civil engineer who is responsible directly to the city engineer. The present organization plan of the division is shown in the following tabulation:

Name of Unit	Title of Head of Unit	No. of Positions	Annual Payroll Cost
Division of sewage & waste treatment	Sr. engineer, civil	1	$ 8,400
Richmond Sunset sewage treat. plant	Supt. sewage treat. plant	20	86,261
North Point sewage treatment plant	Supt. sewage treat. plant	23	91,581
Southeast sewage treatment plant and sludge plant	Supt. sewage treat. plant	26	101,283
Totals		70	$267,525

The staff of the division as of November 21, 1951 totaled 70 as shown in the following tabulation:

Positions	No. of Positions	Rate of Pay Daily	Rate of Pay Monthly	Total Payroll Cost
Sr. engineer, civil (sewage disposal)	1		$700	$ 8,400
Supt. sewage treat.plant(Richmond Sunset)	1		575	6,900
Chemist, sewage treat. plant	1		460	5,520
Water chemist	1		290	3,480
Chief operating engineer	1		400	4,800
Operating engineer	2		380	9,120
Operating engineer	3		360	12,960
Jr. operating engineer	5		340	20,400
Operating engineer (maintenance)	1		380	4,560
Laborer	3	$13.60		10,323
Chauffeur	1	19.36		4,898
General clerk-stenographer	1		275	3,300
Supt. sewage treat. plant (No. Point)	1		650	7,800
Chemist, sewage treat. plant	1		460	5,520
Water chemist	1		290	3,480
Water chemist	1		300	3,600
Chief operating engineer	1		400	4,800
Operating engineer	3		380	13,680
Operating engineer	2		350	8,400
Jr. operating engineer	10		280	33,600
Operating engineer	1		380	4,560
Laborer	1	13.60		3,441
General clerk-stenographer	1		225	2,700
Supt. sewage treat. plant (S.E. plant)	1		550	6,600
Chemist, sewage treat. plant	1		460	5,520
Water chemist	1		350	4,200
Water chemist	1		290	3,480
Chief operating engineer	1		480	5,760
Operating engineer	1		380	4,560
Operating engineer	4		320	15,360
Jr. operating engineer	1		340	4,080
Jr. operating engineer	1		325	3,900
Jr. operating engineer	9		280	30,240
Operating engineer	1		380	4,560
Laborer	3	13.60		10,323
General clerk-stenographer	1		225	2,700
Total	70			$287,525

By the time the new plants are ready for full operation, the full staff should be recruited and trained. The full complement will be 101 employes of whom 20 will be at the Richmond Sunset plant as at present, 33 will be at the North Point plant,47 will be at the Southeast plant and sludge plant, and the head of

the unit will have an office at the city hall and another in the southeast administration building. The planned staff for the division will be assigned as follows:

Position	Richmond Sunset Plant	North Point Plant	Southeast & Sludge Plant	Total
Senior engineer, civil F-412a				1
Supt. sewage treatment plant F-527	1	1	1	3
Chemist, sewage treatment plant L-115	1	1	1	3
Water chemist L-130	1	2	3	6
Chief operating engineer O-172	1	1	1	3
Operating engineer O-168.1	6	6	7	19
Jr. operating engineer O-166.1	5	15	27	47
Chauffeur O-1	1	1		2
Laborer J-4	3	4	5	12
Janitor C-104		1	1	2
General clerk-stenographer B-408	1	1	1	3
Totals	20	33	47	101

The number of operating employes appears to be adequate without being excessive. The plan will have to be tested over a reasonable period of time and probably some adjustments will have to be made.

c. Place of Sewage Plant Operation in the Department Organization: An engineering bureau of a department of public works should provide professional consulting service for all operations of the department, but ordinarily should not be directly responsible for operating activities. It is proper and desirable that an engineering agency should review operating and maintenance programs; evaluate methods, procedures, production, performance, and cost; and make recommendations for any changes that will improve the work or decrease the cost. In this role, the bureau is a staff agency and should not be given line responsibilities for operating and maintenance work.

The difficulty in applying such a policy to sewage treatment plant operation is that the operating work should be headed and managed by a highly qualified specialist in sewage treatment, and one who is thoroughly conversant with the purpose and design of treatment works, the operation and maintenance of the plants, and the problems of sewage treatment and industrial wastes. It is highly desirable and even essential that the senior engineer who now heads the division remain in charge of the activities wherever they may be placed in the department. This may result in depriving the bureau of engineering of the only engineer who is qualified to give consulting advice on sewage treatment plant operation, on research programs, and on desirable additions, changes, or extensions to the treatment facilities.

It is believed that the division should be kept as a part of the bureau of engineering until the new plants are in satisfactory operation and the important difficulties corrected. After that, it is desirable that the unit be shifted to the operations side of the department. It is recommended that the division of sewage and waste treatment be retained in the bureau of engineering

until the new plants are operating smoothly. It is further recommended that the entire division, including the supervising head, be transferred to the maintenance and operation branch of the department, and that a new bureau of sewage treatment be created and be responsible directly to the assistant director of public works.

d. Administration of the Division: Except for the division head, no provision has been made for the administration of the sewage and waste treatment work. It may be the policy to delegate all possible administrative matters to the superintendents of the sewage treatment plant, and in the main it is advisable to require the superintendents to solve their own problems, but there is some work which must be done at a higher level. For the first few months, it will be necessary for the head of the division to study operating methods and practices, and to establish and revise standard operating procedures, so that the work is done in the same way throughout the unit. In addition, much of the industrial waste control work should properly be done by a central unit. A research and study program must be developed and controlled by the head of the division, even though much of the actual research work is assigned to one or another of the superintendents.

It is not usually satisfactory that the head of a unit should have to depend on using the office services of one of the subordinate branches. It is therefore recommended that a qualified secretary be provided for the head of the division.

The staff for administrative and technical studies could be provided in either of two ways. One or more engineers could be provided to do the necessary work, or the services of the bureau of engineering could be utilized, either to take responsibility for complete studies, or to lend engineers to the division. It is recommended that, if competent staff is available, the bureau of engineering conduct most of the special studies for the division, and that the bureau of engineering assign engineers as needed to conduct regular investigations under the direction of the division.

11. Division of Administration

a. Functions and Activities: The division of administration is responsible for administering public works contract matters, and for providing administrative services for the bureau of engineering. Specifically the division conducts the following activities:

(1) Analyzing progress estimates and final reports, reviewing extra work costs, and determining and recommending contract estimates and final payments.

(2) Preparing weekly construction progress reports and reviewing daily reports from projects.

(3) Settling claims with contractors on quantities and prices.

(4) Handling the administrative work of the bureau, including maintaining personnel records, processing new employes, issuing work orders, issuing requisitions for materials and services, processing time records, and providing office services.

(5) Operating a stenographic and clerical pool, and conducting a duplicating service.

(6) Keeping records of assessments, assessment bonds, street improvement contracts and proceedings, and engineering charges on projects; billing engineering and inspection fees, and notifying property owners of proposed improvements.

(7) Tabulating bids on improvement work, and keeping records of letting and awards; preparing contracts and checking on insurance and bonds of contractors; and preparing advertisements of projects for bid.

The work of the division is divided generally into three parts, which have little relation to each other, except that all are staff activities. There is no great disadvantage in having them under common supervision, but in the proposed organization plan it is suggested that the three staff functions be given separate status in the contract control, assessment, and office services units.

b. Organization and Staff for Engineering Administration: The division of administration is headed by a civil engineer, who is responsible directly to the city engineer. The organization and staff of the division is shown in the following tabulation:

Position	No. of Positions	Rate of Pay Monthly	Annual Payroll Cost
Engineer, civil (administrative)	1a/	$650	$ 7,800
Asst. engineer II, civil	1a/	570	6,840
Jr. engineer, civil	1a/	420	5,040
General clerk-typist	1	285	3,420
Senior clerk	1a/	350	4,200
General clerk-stenographer	1a/	285	3,420
Head clerk (contracts)	1a/	410	4,920
Head clerk	1	390	4,680
Senior clerk	1	320	3,840
General clerk-stenographer	2	285	6,840
General clerk-stenographer	1	265	3,180
General clerk-stenographer	3b/	225	8,100
General clerk-typist	1a/	285	3,420
General clerk-typist	1	225	2,700
General clerk-stenographer	1	285	3,420
Office assistant (messenger)	1	190	2,280
Totals	19		$74,100

a/ Permanent budget position

b/ One permanent budget position

A proposed organization plan is presented here for the administrative services staff office. The contract administration and assessment staff offices will be discussed in subsequent sections. The remaining activity of the division, advertising for and taking bids and preparing contracts, should be transferred to the administration branch of the department.

It is suggested that two sections be established in the administrative services office as follows:

Name of Unit	Title of Head of Unit
Administrative services office	Office manager
Records section	Records clerk
Stenographic pool	Head stenographer

The records section would be responsible for maintaining personnel, time, equipment, and other administrative records of the bureau of engineering, for handling personnel procedure, for issuing requisitions for supplies and services, for issuing work orders for the bureau, for arranging transportation for bureau personnel, for providing a messenger service for the bureau, and for handling other administrative services.

The stenographic pool would be responsible for providing clerical and stenographic service to any division or section of the bureau as required, and for doing the necessary duplicating work.

It is recommended that the administrative services office be established immediately responsible to the assistant city engineer. It is further recommended that the proposal advertisement and tabulation, and the contract preparation work be transferred to the administration branch of the department.

12. Contracts Administration Office

The establishment of a contracts administration office has been recommended as one of the staff offices of the bureau. The office should be headed by a contracts engineer who would be responsible directly to the assistant city engineer.

The office would be responsible for analyzing the daily and weekly reports from improvement projects, for analyzing progress estimates and final reports, for determining contract estimates and final payments, for analyzing extra work costs, for dealing with engineers and contractors on quantities and prices and settling claims, for modifying contracts, and, generally, for handling contract control matters for the city engineer.

13. Permit and Inspection Office

It has been recommended that a permit and inspection office be established as one of the staff offices of the bureau of engineering. The office should be headed by a permit and inspection engineer who would be responsible directly to the assistant city engineer.

The office would be responsible for inspecting pavements, sidewalks, and other street structures to discover failures or misuse; for reviewing applications for permits to excavate in streets or to use street space; for making investigations and inspections in connection with encroachments, street use permits, large and heavy load permits, and excavation permits; for determining the fees for street permits; for enforcing the repair of defective sidewalks; for investigating claims for damage due to defective sidewalks and cooperating with

the city attorney's office on such claims; for receiving, recording, and transmitting complaints of defective streets, sidewalks, or other street structures; and, generally, for acting for the city engineer and the director of public works to keep street facilities in satisfactory condition.

14. Assessment Office

The establishment of an assessment office as one of the staff offices of the bureau of engineering has been recommended. The office should be headed by an assessment engineer who would be responsible directly to the assistant city engineer. It would comprise, in the main, the assessment unit of the street improvement section of the division of streets and highways and the senior clerk, from the division of administration, who handles assessment records.

The office would be responsible for conducting all special assessment procedure activities, and, specifically, for checking estimates and specifications and making preliminary assessments to properties, checking cost estimates and quantities on projects involving assessment of cost or city pay contracts, representing the city engineer and the director of public works on special assessment matters, for keeping records of assessments, assessment bonds, and street improvement contracts and proceedings, for recording engineering charges on projects, for billing engineering and inspection fees, and for notifying property owners of proposed improvements.

15. Plans and Budgets Office

a. Functions and Activities: The plans and budgets office is responsible for dealing with the state highway department, and preparing reports on costs, claims, and programs. Specifically the office engages in the following activities:

(1) Reporting on state aid claims, applications, and resolutions.

(2) Coordinating major street and state highway work with the state highway department, and maintaining records of gas tax financed projects.

(3) Developing capital improvement programs for the department, and reporting them to the city planning commission.

(4) Developing preliminary material for annual budgets and for long range programs.

(5) Making special studies of street, parking, traffic, and transit problems, and of legislation.

(6) Maintaining records of damage claims against the department.

b. Organization and Staff: The plans and budgets office is headed by a civil engineer who is responsible directly to the city engineer. The organization and staff of the office is shown in the following tabulation:

Position	No. of Positions	Rate of Pay Monthly	Annual Payroll Cost
Engineer, civil (program & budget)	1b/	$650	$ 7,800
Draftsman civil	1a/	430	5,160
General clerk	1	285	3,420
Totals	3		$16,380

a/ Regular budget position

b/ Vacant

The office does not have a head at the present time, because of the death of the last incumbent.

It has been recommended that this unit be continued as a staff office of the bureau and that the unit be placed under the direct supervision of the assistant city engineer. The head of the office should be given an administrative title such as plans and budget engineer. The functions of the office should be substantially the same as at present, but with a somewhat more positive responsibility for the budget control of the capital outlay improvement program to determine what monies will be available to the city for public works improvements and when they will be available, and to schedule the projects for the city engineer and the director of public works.

16. Engineering Procedures

a. Engineering for Maintenance Operations: The operating branches of the department of public works face many engineering problems, some of which can be solved, more or less satisfactorily, by operating personnel, but many of which cannot be so solved, either because of the lack of manpower or time, or the lack of technically competent personnel. One of the principal functions of a modern municipal engineering agency is to provide consulting engineering service to the operating groups. One function of this service is to study special problems and to develop plans and specifications in much the same way as for capital improvement projects. Another function is the more or less continuing inspection and study of materials, methods, equipment, and practices on behalf of the director of public works, in order to maintain a high degree of effectiveness and economy in the operating work.

The engineering department now provides some of this service, but the service is not as positive or complete as is desirable. There is a tendency to regard maintenance work as secondary to the main function of designing and building new improvements, and to reserve the former until there may be a lull in the construction program. Then, too, there are too few engineers who are qualified as consultants. It is recommended that a regular program of maintenance engineering be developed, as a part of the whole work program of the bureau, and that an adequate number of man months be made available by the various divisions

concerned to carry out the program effectively. Many of the studies and investigations recommended in the reports on the operating agencies could very well be made by the engineering forces.

b. Inspection of Utility Excavations: The large utility trenches in city streets are very carefully inspected and controlled by the bureau, to ensure that satisfactory methods and materials are used. Because of the lack of sufficient personnel, the great number of minor openings can be given only casual inspection, sometimes simply by driving by the patched openings to see if the repair job appears to be satisfactory. The many openings for side sewer installation and repair are not inspected at all, either to check the work done by the bureau of sewer repair or that done by the plumbers in the sidewalk areas, although an inspection fee of two dollars is collected for each side sewer permit.

In connection with the inspection work that is done, the interest seems to be entirely on backfill and repaving, which are exceedingly important, but the city should also be interested in the actual installation of conduits, vaults, manholes, and the like, both as to design and construction. Inquiry indicates that the city receives considerably more revenue from the inspection of utility excavations than is spent in inspection work. It is recommended that an adequate staff of inspectors be provided to permit adequate inspection of all underground construction in the city streets, including the actual installations, the backfill, and the replacement of the pavement or sidewalk, regardless of whether the work is done by utility companies, contractors, or city forces.

It is further recommended that an investigation be made of the amount of the inspection fees collected on each kind of excavation permit, and that the fee level be adjusted to reimburse the city for the cost of the inspections.

c. Survey of Pavement and Sidewalk Conditions: A more or less systematic inspection of the condition of the sidewalks of the city is made by the bureau, although at the present rate of survey it will take several years to complete the review of all districts. The inspection of pavement conditions is not at all systematic, and is limited to reporting holes and other dangerous conditions as they are noticed while driving around the city on other activities. It is proposed, in the chapter on street maintenance, that a systematic inspection of pavements be made, not only to discover dangerous conditions, but to form the basis of a sound maintenance program and of an adequate resurfacing and reconstruction program.

It is recommended that the systematic sidewalk inspection be accelerated to complete the survey of all sidewalks within a two year period. It is further recommended that the bureau conduct a comprehensive survey of pavement conditions for the purpose of developing sound maintenance and improvement programs.

d. Sidewalk Repair by City Forces: At the present time, about 90 percent of the notices to repair defective sidewalks result in action by the property owners concerned to repair the walks or to have the work done by contractors. It is difficult and expensive to have the remaining 10 percent of repairs made under present methods. It is recommended that a procedure be

developed by the bureau and other interested agencies, by which all ordered sidewalk repairs, that are not made by the owners after two notices, will be repaired promptly by the bureau of street repair and the actual cost or a flat charge per square foot charged to the owners and placed on the tax bill if not paid.

e. Complete Pavement Design: It is the practice at the present time simply to prepare a plan of proposed small pavement projects as the basis for preliminary proceedings, for obtaining bids, and for awarding contracts for the construction work. The actual pavement design is not made until the contractor is ready for construction stakes. For pavements that are to be constructed by private contract, the situation is much the same. The city has to make the complete plans eventually and it would be better to do this work before it is actually needed. It is the preferred practice, and in many jurisdictions is made mandatory by law, to show the complete design of pavements in the plans and specifications, including all drainage facilities, centerline and gutter grades, and intersection details. It is recommended that complete pavement plans be prepared before projects are advertised for bids; and that the necessary design information be developed for private work when the permit is issued for the work.

f. Cost Data for Estimated Purposes: Estimating the probable cost of public works improvements is difficult enough in stable periods, but it becomes even more difficult in times of material shortages, rising prices, and various controls, and estimating units should be provided with all the information available to make the work easier and better. It is reported that the bureau does not maintain historical data on prices and costs or the trends of public works construction costs for the city or other public works agencies. Neither are up-to-date unit costs on public and private work obtained in adequate quantity. It is recommended that certain basic trends be determined and recorded for the use of the estimating group, that cost information be recorded on city contracts, and that current contract costs and prices be obtained from other jurisdictions to the greatest extent practicable.

g. Review of Plans and Specifications by Construction Unit: The plans and specifications for improvement projects are not now reviewed by the division of construction before the projects are advertised and the contracts awarded. Sometimes the plans are seen by the division of construction for the first time when construction is about to begin. It is generally recognized that trained construction engineers will often discover details or methods in proposed plans or specifications that will cause difficulty in the construction work and, by examining the plans before the proposals are accepted, will make it possible to avoid contract changes and extras. It is recommended that the plans and specifications, particularly of large projects, be reviewed by the division of construction before those projects are advertised for bids.

h. Delays on Contract Change Orders: The charter now provides that "if it becomes necessary, in the prosecution of any work or improvement under contract, to make alterations or modifications, or provide for extras in such contract which shall increase the contract cost, such alterations, modifications, or extras shall be made only on the recommendation of the department head

responsible for the supervision of the contract, together with the approval of the chief administrative office . . . and also the approval of the controller." Actually, it requires at least two or three weeks to obtain the necessary authorization under this elaborate system of control. Some contract changes may at times be anticipated long enough ahead to get the necessary approval in time to avoid delaying a contractor's operations, but, usually, decisions must be reached much faster than that, and often must be made within a few hours, to avoid costly and dangerous shutdown of construction work. It is true that contractors sometimes proceed at their own risk on the assumption that a change or extra will be approved, but this is not fair to the contractors and may result in a general increase in bids to allow for such risks.

Such involved control systems are not customary in other jurisdictions and it is believed that adequate control can be maintained in a much simpler manner. It is usual in most states and cities to permit the director of public works to authorize, in writing, contract changes and extras that cost less than a specified amount, ordinarily from $500 to $5000, depending on the jurisdiction. Such change orders are effective when signed by the director of public works and by the contractor, and suitable copies are forwarded to the controller, accounting office, and perhaps other control offices.

It is recommended that the charter be amended to simplify the approval of changes and extras to contracts, and specifically, that the director of public works be authorized to order without other approval, such work changes up to the amount of $2000 on an extra or change.

i. Sanitary Fill Supervision: Under existing ordinances it is the duty of the director of public works to cause continuous engineering inspection to be made of all garbage disposal. Formerly an inspector was assigned to the sanitary fill in San Mateo county to review the disposal operations, but at the present time such continuous inspection has been abandoned and periodical visits are made instead, ordinarily about once a week.

The purpose of the inspections is not clear from the ordinance and the department is not given any responsibility or duty other than to make engineering inspections. It is felt that the department should either be made responsible, from a sanitary engineering viewpoint, for the use of acceptable methods, equipment, and practices, or that it be relieved of the inspection duty. It is recommended that a review be made of this situation and that specific responsibilities be assigned, or that the ordinance requiring the inspection be repealed.

j. Mechanical Engineering Service: The mechanical engineering service of the bureau is called on frequently by the architecture, building repair, and other agencies to provide specialist assistance in design and operating problems of a mechanical nature. Many of the requests are concerned with heating and ventilating. Many requests, however, have to be denied because of the shortage of personnel, even though the expense may be reimbursable through interdepartment work orders.

There is a great need for mechanical engineering service in connection with the maintenance and operation of public buildings. Periodic surveys of the heating and ventilating systems in such buildings would be distinctly worthwhile and the savings realized by better and more economical operation would probably pay for the cost of this service many times over.

It is believed that an expansion of the mechanical engineering service, particularly in the heating and ventilating field, would prove to be economical for the city.

k. Control of Stop Signs: The control of stop signs is for some reason treated in a different manner than is the control of other traffic signs and of painting traffic lines and signs on pavements. Whereas most traffic control decisions are based on traffic engineering studies and on the facts that prove or disprove the need for certain kinds of control, the installation of stop signs at through streets is determined by the board of supervisors after recommendation by the board of police commissioners. It is reported that many such signs cannot be justified by traffic data and that they are often placed simply to slow up traffic.

It is recommended that the present laws relating to boulevard stop signs, and requiring the authorization of the board of supervisors and the recommendation of the police commissioners, be repealed and that the responsibility for stop sign installation be placed with other traffic engineering work.

l. Budget Positions in the Bureau of Engineering: A part of the authorized funds for the bureau are provided through budget appropriations for work of a general and administrative nature, but the largest part comes from interdepartment work order allotments, from gas tax funds, from bond funds, from special assessment funds, from permit fees, and from numerous other sources which are generally called interdepartment funds. The employes authorized to perform work to be charged to interdepartment funds are not regular budget employes, but are more or less temporary, in that the bureau cannot retain them in service if there are not adequate interdepartment funds with which to pay them. The plan, generally, is an excellent one, but it has been reported from numerous sources during the study that there are not sufficient budget employes available to do all the regular and essential budgetary work or, at least, that they are not distributed or assigned in accordance with the budgetary workload. In consequence, interdepartment employes have to do budget work, and their time on such work is mischarged to specific work orders, thus resulting in overcharging projects or work orders. Some units, notably the electrical and structural sections of the division of design, and the division of traffic engineering, do not have any budget employes at all, while others have just one or two positions filled by such employes. In some cases, budgetary employes are assigned to work order jobs and their time must be charged to a budget account.

It is believed that a study should be made of the man hours required for regular budget activities in each organization unit, and that provision should be made for employes, both budget and non-budget, to charge their time,

as actually spent, to budget and non-budget accounts.

m. Time Reporting of Engineering Employes: The time of each engineering employe is reported daily for each unit, showing the charge to be made against a project, work order, or budget account. Except in unusual circumstances, the daily total of eight hours is charged to a single account or work order and not divided, even though the employe concerned actually worked on two or more jobs under different accounts or work orders. It is claimed that the present method is simple and that in the long run the time is probably rather accurately charged. It is one of the methods by which a supervisor may spend several hours a day on normal budgetary activities, and still charge the whole eight hours to a work order or a project.

Normally, in such work, the time of engineers is reported to the nearest hours, although sometimes fractional hours are believed to be desirable for sound accounting. It is recommended that the time of engineers be reported to the nearest hour and that the time sheets be certified correct by the employe concerned and by his supervisor.

n. Standard Procedures: Some of the regular procedures of the bureau have been developed in writing either in the form of small printed or mimeographed manuals or simply as loose instruction sheets. These standard procedures are generally very good although probably not as comprehensive as is desirable. None of them explains adequately the organization plan of the bureau and unit or the relationships with other units and agencies. It is believed that a much more extensive use of standard manuals of practice is desirable.

o. Records of Accepted Streets: The records of original paving and acceptance of pavements are not complete enough to permit ready determination of the exact status. This is especially important for the street maintenance forces, because the city is obligated to maintain accepted pavements and is restricted in the kind of work that it can do on unaccepted streets. The information is also important for the engineering groups. A list is available in the bureau showing the streets that are known to have been officially accepted. There are many streets not included therein because no record of acceptance could be found. It is believed that the data on the omitted streets should be carefully reviewed and that a recommendation be made to the board of supervisors to take suitable action to declare accepted those streets that probably have been improved satisfactorily by the abutting owners.

17. Equipment for Engineering Services

a. Present Equipment: At the present time there are 42 vehicles in use by the bureau of engineering, of which 20 are owned by the city, 8 are rented by the city, and 14 are private cars used by employes on city work. The equipment is shown in the following tabulation:

Kind of Equipment	Make	No. of Items	Year Purchased
City-owned Cars			
Dump truck	Reo	2	1939
Sedan	Plymounth	1	1942[a]
Sedan	Chevrolet	1	1942
Sedan	Ford	2	1942
Carryall	Chevrolet	1	1942
Coupe	Ford	1	1946
Sedan	Ford	1	1947
Station wagon	Ford	1	1947
Sedan	Chevrolet	1	1948
Sedan	Ford	1	1948
Station wagon	Chevrolet	1	1948
Station wagon	Ford	1	1948
Pick-up truck ½ ton	Chevrolet	1	1949
Sedan	Ford	1	1950
Suburban	G.M.C.	1	1950
Suburban	G.M.C.	1	1951
Pick-up truck	G.M.C.	2	1951
Total		20	
Rented Cars			
Sedan	Plymouth	4	1950
Coupe	Plymouth	1	1950
Tudor	Plymouth	2	1950
Station wagon	Ford	1	1950
Total		8	

The equipment is assigned and used as shown in the following tabulation:

	City-Owned Cars	City Rented Cars	Privately Owned Cars	Total
City engineer's office	1			1
Division of streets & highways	2	3		5
Division of design	2	1		3
Division of surveys & mapping	6	1		7
Division of traffic engineering	3[a]	1	1	5
Division of construction	2	2	6	10
Division of sewage & waste treatment	4[b]		7	11
Totals	20	8	14	42

a/ One pick-up truck included.
b/ Two trucks and two pick-up trucks.

Actually, the available city-owned vehicles are pooled, in the sense that several employes use a single vehicle as assigned by the head of the unit concerned. Any central pooling of the bureau vehicles at the present time would not necessarily improve the situation and might even make it worse, because some employe would have to decide which requests for transportation are the most important as the basis for granting some requests and denying or deferring others. For a central pool of any kind to be effective, there must be enough reserve equipment so that, except at peak loads, there will always be a vehicle available for authorized transport.

b. Appraisal of the Transportation Facilities of the Bureau: Municipal engineering work deals mainly with public works improvement and maintenance matters, and, in consequence, a large part of the work must be done in the field. Supervisors must visit the different projects under their direction, inspectors and surveyors must get to their jobs and often move from job to job, the designing force must make occasional field surveys and investigations, the traffic engineers must make surveys and investigations, and the sewage operating supervisors must be mobile. A large part of the transportation must necessarily be by automobile, not only to save the time of the engineers, but to get them to many places not served by the public transportation system; some movements, however, can be made by bus or streetcar. Actually, the 23 automobiles, five trucks, and 14 privately-owned cars provide most of the transportation, but about eleven dollars a month is spent on bus fares indicating that about 55 streetcar or bus trips are made each month.

It is evident that present facilities are not adequate to get all the engineers and others to the places they should go for the most effective administration and conduct of the work. The most universal complaint heard during the study was that the available cars are in use almost full time and that many requests for transportation have to be denied. Undoubtedly there is some loss to the city if engineers cannot get out promptly on their assigned work.

c. Parking Space for Engineering Cars: Many of the field employes, as a part of their jobs, have to spend some part of their day in city hall offices. In particular, inspectors, field supervisors, and survey parties are required to be at the city hall a certain part of each day, but many design and other employes also have to make occasional trips in connection with their work. Either city-owned cars or regularly authorized privately owned cars are used by these employes, but no parking space near city hall is available. Frequently the employes must spend considerable time searching for a parking space or walking several blocks after finding one. Some tolerance is given by the police in parking city cars in restricted zones, but sometimes the cars are tagged and the employes have to pay the fines. It is not proper for employes to waste many minutes a day in parking nor is it fair to force them into positions in which they have to pay occasional fines. If the lost time could be evaluated, there would probably be justification for spending a considerable amount in providing parking facilities for city cars and authorized private cars.

It is recommended that a study be made of the parking requirements for cars actually used on city business, and that efforts be made to secure a parking lot or garage.

d. Engineering Office Space: The bureau of engineering is not well housed for the efficient conduct of its work. The forces are seriously divided, even within divisions and sections, and many of the offices and drafting rooms are too crowded to permit the best work.

Under ideal conditions, the entire bureau would be housed in one building, each division would be consolidated reasonably near the city engineer's office, and each section and unit would form a compact group within the division space. Of course, each group would have adequate room for employe working space, for supervisor desks, and for necessary files. At present, for example, the division of design is divided between the city hall and the building at 45 Hyde Street, with three sections at Hyde Street and four divisions at the city hall. The street and highway division is seriously cramped in a series of small rooms, some sections are separated physically from others, and at least one section is divided into two widely separated rooms.

It is believed that serious consideration should be given to providing better office, drafting room, and other quarters, needed by the bureau of engineering, so that each unit can be provided with adequate space and so that all central units can be housed together. It might be advisable for the city to construct a public works building near the city hall and thus relieve the crowded city hall conditions.

e. Cameras for Field Personnel: On some aspects of engineering supervision, it is very desirable to take small photographs of conditions that may eventually be the source of claims and law suits. This is true on construction work, particularly on those parts of structure that will be concealed, but it is particularly beneficial on inspection of street and sidewalk conditions.

It is recommended that small cameras be made available to the inspection, construction, and possibly to other branches to make it possible to record photographic evidence of conditions.

f. Rental of Automobiles: Many cities in recent years have contracted for automobile use on a lease basis and have justified this on the basis of savings as compared with the municipal ownership of cars. It would appear, however, that the eight vehicles rented by the bureau cost considerably more than the city pays for its own vehicles.

The average cost in 1949-50 for maintaining and operating 14 automoviles was $279. This does not include the expense of owning the equipment, which is estimated to be about $350 a year for depreciation on a five-year basis. Thus the total average cost is $629 a year or $52.40 a month. In comparison, the rented cars cost $69.95 a month without gas or oil, or a total of $79.50 a month. These figures indicate that the city is losing about $27 a month for each rented car. The automobile cost data should be further studied and, if the city's expense records are found to be correct, it is believed that the city should adopt a policy of owning rather than renting its automobile equipment.

18. Expenditures for Engineering

a. The total expenditures for the bureau of engineering for the last two fiscal years and the budget for the current year are shown in the following tabulation, divided as to regular budget and reimbursable expenditures:

Type of Expenditure	Expenditures 1949-50	1950-51	1951-52
General Fund			
Personal services	$306,681	$379,320	$710,199
Contractual services	7,669	7,445	53,064
Contractual services - parking meters			30,000
Materials and supplies	5,600	4,908	121,650
Materials and supplies - parking meters			1,000
Equipment	1,324	3,244	18,624
Sewer extensions for city properties			4,000
Fixed charges			43
Fixed charges - parking meters			4,827
Special inspection			10,000
Totals	$321,274	$394,917	$953,407
Interdepartmental			
Personal services	$916,921[a]	$949,838[b]	[c]
Materials and misc. expense	14,915	12,292	
Totals	$931,836	$962,130	
Gross expenditure	$1,253,110	$1,367,047	

a/ Includes $119,915 overhead allocations of indirect labor, sick leave, holidays, etc.

b/ Includes $149,870 overhead allocations of indirect labor, sick leave, holidays, etc.

c/ Indeterminable - depends on work done during the year.

CHAPTER IV

ARCHITECTURE

1. Introduction

A central architectural service to supervise the design, construction, and alteration of public buildings is provided by the department of public works. Prior to 1907, the function was assigned to the bureau of buildings of the board of public works, but in that year a separate bureau of architecture was established inside the board to handle architectural services. Until about 1930, the primary function of the bureau was to provide inspection services and only limited architectural services.

The amount of work performed by the bureau and the size of the staff has fluctuated considerably, depending primarily on the size of the school building programs. Large school building programs were initiated in 1920, 1934, 1940, and 1948. At the start of the $48,000,000 1948 school building program, the bureau had a staff of ten positions, the city architect, two draftsmen, a clerk, and six building inspectors.

As of August 15, 1951, the bureau had 62 employes at an annual salary cost of $278,780. The budget appropriation for the bureau for the fiscal year 1951-1952 was $38,775 compared with actual budget expenditures of $32,603 in the fiscal year 1949-1950. The expenditures of the bureau for the fiscal year 1949-1950 for interdepartment work was $238,973, primarily for the salaries of those positions directly charged to individual projects.

2. Functions and Activities

The bureau of architecture is responsible for providing architectural services for the agencies of the City and County of San Francisco. The specific functions and activities of the bureau may be stated as follows:

a. Reviewing architectural drawings, plans, and specifications prepared by architects in connection with the construction or alteration of public buildings.

b. Advising architects of suggested changes to meet bureau standards and the directives of the other city agencies.

c. Advising city agencies on the architectural aspects of building construction and maintenance

d. Preparing specifications for bids for city and county agencies on alterations and repair work, the cost of which is in excess of $2,000.

e. Preparing standards for various phases of building construction to be used by architects in the preparation of plans and specifications.

f. Providing inspection services for all construction, alteration, and repair jobs for which the bureau prepared specifications or is responsible for the review of specifications.

g. At the request of the city and county agencies, providing architectural services such as designing buildings and preparing plans and specifications for such buildings.

3. Present Organization and Staff

a. Organization: The bureau of architecture is headed by a city architect, a civil service employe who is appointed by and directly responsible to the director of public works. As of August 15, 1951, there were five main units in the organization. The name of each unit, the title of the head of each unit, the number of positions, and the annual payroll cost are shown in the following tabulation (lines of descending authority are shown by indentation):

Name of Unit	Title of Head of Unit	Number of Positions	Annual Payroll Cost
Bureau of architecture	City architect	1	$ 10,000
Specifications division	Architect	6	25,200
Maintenance division	Senior architectural draftsman	2	8,800
Office services division	General clerk-stenographer	3	9,300
Field inspection division	Supervising construction inspector	33	124,500
Office inspection section	Senior architectural draftsman	3	11,640
Building planning division	Assistant city architect	3	19,680
Design section	Architect	4	24,240
Working drawings section	Architect	3	18,000
Preliminary drawings section	Architect	2	13,320
Institution section	Architect	2	14,100
Totals		62	$278,780

The units of the bureau have not been given official titles. The titles used in the tabulation are those in more or less general use and will serve to identify the units in the discussion which follows.

The specifications division works principally on developing standards for items common to many public buildings, such as acoustic ceilings, blackboards, and the like. Architects who are commissioned to prepare the plans and specifications for new buildings are instructed to use these standards in the development of the plans and specifications.

The maintenance division prepares specifications for repair work to be done by contract, when requested to do so by city and county agencies. The work involves conferences with the agencies to determine the extent and kind of work required, reviews of the site of the work to discover any features which might have a bearing on the work, and preparation of the necessary specifications. The division subsequently makes recommendations to the director of public works on the award of contracts.

The office services division is responsible for providing clerical work for the main office of the bureau engaged in the general functions of the bureau. Clerical services for inspection and building construction work are provided in the divisions concerned with that work.

The field inspection division provides inspectional services for all new building construction and for those building alterations and maintenance projects for which the bureau prepared specifications. Inspection is provided to ensure that the requirements of the plans and specifications are fulfilled and that the city's interests are protected.

The office inspection section coordinates the work of the bureau with that of the outside architects, the contractors, and the interested city agencies. All correspondence relating to actual construction work is processed through this section.

The building planning division provides professional architectural services for new buildings and major alterations. The organization of this division is somewhat fluid, depending on the volume and kind of work undertaken, but there is sufficient permanent specialization within the division to permit the identification of those sections performing specialized functions. The design section develops the architectural plans and specifications for work on all public buildings except institutions not requiring an outside architect. The working drawings section and the preliminary drawings section review architectural drawings during certain stages of plan development. The institution section works principally on plans for various city institutions such as the San Francisco hospital and the Laguna Honda home. In addition to these sections, an architect and a general clerk-stenographer in the division work directly for the assistant city architect on various work as assigned.

b. Staff: The number of positions assigned to each unit in the bureau and the annual payroll cost as of August 15, 1951 are shown in the tabulation that follows (lines of descending authority are shown by indentations):

Position	Number of Positions	Monthly Rate of Pay	Annual Payroll Cost
City architect	1 a/	$833	$10,000
Architect	1	625	7,500
Senior architectural draftsman	1	485	5,820
General clerk (temporary)	1	225	2,700
Office assistant	1	215	2,580
General clerk-typist	1	285	3,420
General clerk-typist	1	265	3,180
Senior architectural draftsman	1 a/	550	6,600
Office assistant	1 a/	190	2,280
General clerk-stenographer	1 a/	285	3,420
General clerk-stenographer	1	265	3,180
General clerk-stenographer (temporary)	1	225	2,700
Supervising construction inspector	1	490	5,880
Building inspector	7	490	41,160
Building inspector	3	470	16,920
Building inspector	5	450	27,000
Building inspector	3	430	15,480
Building inspector (temporary)	14	430	18,060 b/
Senior architectural draftsman	1 a/	460	5,520
General clerk-stenographer	1	285	3,420
General clerk-stenographer	1	225	2,700
Assistant city architect	1 a/	725	8,700
Architect	1	650	7,800
Senior architectural draftsman	1	510	6,120
Senior architectural draftsman	1	460	5,520
Architectural draftsman	1	400	4,800
Architect	1	650	7,800
Architect	1	625	7,500
General clerk-typist	1	225	2,700
Architect	1	650	7,800
Senior architectural draftsman	1	460	5,520

(Contd.)

Position	Number of Positions	Monthly Rate of Pay	Annual Payroll Cost
Architect	1	$625	$7,500
Senior architectural draftsman	1	550	6,600
Architect	1	650	7,800
General clerk-stenographer	1	265	3,180
Totals	62		$278,780

a/ Salary for position provided in the budget of the bureau.
b/ Annual salary cost computed for three months during which time major school alteration program is in effect.

4. Comments on Organization and Staff

a. Authority for Bureau Operations: The organization of the bureau is not clearly defined or understood by bureau personnel. Neither of the two organization charts submitted to the survey staff portrays the organization as it exists. Some of the employes in the bureau report conflicting relationships that may be based on inaccurate organization charts or perhaps on inaccurate information given to the employes. As an example in point, the supervising construction inspector reports that the senior architectural draftsman in charge of the office inspection section is his subordinate. The senior architectural draftsman reports that he is directly responsible to the city architect and is not aware of his responsibility to the supervising construction inspector. At different times the city architect reported that either contention is correct.

Basically the bureau has a good plan of organization. The work of the bureau is divided approximately equally between the city architect and his assistant and the span of control for each is kept within reasonable working proportions. The organization of the bureau is kept flexible to meet the various requirements imposed on the bureau.

One of the basic responsibilities of management in the bureau is to assign definite duties and responsibilities to every member of the staff and to identify the lines through which authority and responsibility flow from the city architect to every position in the bureau. Every employe should be aware of his managerial responsibilities and of his responsibility to his direct superior. The most elementary requirement of a good plan of organization is to define clearly the lines of authority and responsibility for the entire organization. This requirement is a basic one and is as essential to a bureau of architecture as to any other organization.

It is recommended that the management of the bureau develop and report accurately its plan of organization and define the authority and responsibility of every position in the bureau, in order to eliminate the present confusion and misunderstanding.

b. Duties of the City Architect: Much of the work of the bureau requires a considerable amount of coordination among outside architects, contractors, and various city agencies. The bureau is occupied in a large school construction program for the board of education. The city architect is required to provide personal coordination by attending numerous conferences with school authorities and architects and making policy determinations essential to a successful building program.

The city architect is also responsible for the field inspection work of the bureau. This responsibility carries with it the obligation to make personal reviews of the field inspection work. The city architect makes frequent visits to construction work in progress on each major job and reviews the quality of the bureau's inspection work. Such field supervision, essential to appraise the current work and to enable the city architect to plan effectively for future bureau operations, is being competently furnished by the city architect.

In addition to his other duties, the city architect makes personal field reviews of all requests for repair and alteration work from other city agencies. Although such personal reviews gain value from the city architect's considerable experience in such work, it is questionable whether he should devote his time to making these routine appraisals. The time spent on such work might better be spent in other more important tasks. The routine procedure of reviewing requests for repair and alteration work and of preparing plans and bid specifications should be assigned to the head of the maintenance division. The review of the work of this employe would, of course, remain the responsibility of the city architect, who could make periodic checks of the work and provide direction on some of the more difficult jobs. Such an arrangement for handling routine alteration and repair work would allow the city architect to retain close control over the work and would relieve him of the time consuming personal inspection of routine jobs.

It is recommended that the city architect discontinue the practice of making personal reviews of routine requests for repair and alteration work and that such duties be delegated to the head of the maintenance division.

c. Supervision of Field Inspection Unit: The supervising construction inspector regularly supervises 18 building inspectors and, in addition, during the annual summer alteration program for the board of education he supervises 14 temporary building inspectors. The size of the building inspection staff depends primarily on the size of the school construction program and it is expected that any decline in the program will be reflected in a proportional reduction in staff.

Effective direction and control of 18 building inspectors is a heavy load for one supervisor. Although he attempts to see each inspector daily, he is not always able to do so because of the amount of work requiring his personal attention. In some instances, of course, more than one inspector is assigned to a single job and this enables the supervisor to check the work of such inspectors at one location. In general, the supervising construction inspector appears to be doing good work in performing a difficult supervisory task.

During the summer months, when 14 temporary building inspectors are added to the inspection unit, the supervising construction inspector is given an additional supervisory responsibility which he cannot adequately fulfill. The temporary inspectors require more attention than do permanent inspectors because they are not completely familiar with bureau procedures and their work should be reviewed in considerable detail. The supervisor must necessarily neglect the supervision of permanent inspectors to handle this increased work load. It is physically impossible for the supervisor to give positive supervision to 32 inspectors, and he reports that, during the full construction and alteration programs of the summer months, he may not see an individual inspector for three or four days. Such a situation seriously decreases the effectiveness of inspection.

The salary cost for the temporary inspectors is approximately $18,000 annually. One of the best ways to ensure the effective expenditure of that sum is to provide additional, adequate supervision while the additional inspectors are employed. This can be accomplished by assigning a permanent building inspector to supervise the repair and alteration work during the summer program. He should, of course, be appointed to a supervisory position for this temporary period in recognition of the change in his duties. The additional salary for three months for the proposed position instead of a position of building inspector is small when compared to the positive results which would flow from additional supervision. If the bureau feels that it cannot spare an inspector for a period of three months for supervisory work, it could employ an additional temporary building inspector to handle the work of the permanent inspector assigned as a temporary supervisor. Whatever means are used, it is essential that additional supervision be provided for the temporary building inspectors.

It is recommended that a part time inspectional supervisory position be established for a period of three months during the major school alteration and repair program and that the duties of this position include the supervision of the temporary building inspectors assigned to the program.

d. Head of Office Services Division: The office services division is supervised by a general clerk-stenographer who is responsible directly to the city architect. The two employes under the supervision of this general clerk-stenographer are in the same pay range as the head of the division and hold the same civil service title. The delegation of responsibility without due consideration to position classification is harmful to morale and not in conformance with recognized principles of personnel administration. It is recommended that the position of general clerk-stenographer at the head of the office services division be reclassified on the basis of the supervisory responsibilities of the position.

e. Proposed Organization: The proposed organization for the bureau, as shown in the following tabulation, is essentially the same as the present organization:

Name of Unit	Title of Head of Unit
Bureau of architecture	City architect
Standards division	Standards supervisor
Maintenance division	Maintenance supervisor
Office services division	Office supervisor
Building inspection division	Chief building inspector
Office inspection section	Building construction coordinator
Alteration inspection section	Building alteration supervisor
Building planning division	Chief planning architect

It will be noted in the above tabulation that some changes in the names of units and the titles of the heads of units are proposed. These proposed changes are for administrative use only and need not necessarily be incorporated in the civil service titles.

The principal organizational change proposed is in the building inspection division where, during the summer months when the major alteration program for the board of education is in effect, the temporary inspectors would form an alteration inspection section under a building alteration supervisor, who would be directly responsible to the chief building inspector.

No other changes in the organization of the bureau are proposed.

5. Operating Policies and Procedures

a. General Policies and Procedures: The general operating procedures of the bureau are good. The bureau works principally in an advisory capacity for other city agencies and is required to coordinate the efforts of a great many private and public agencies and individuals interested in the erection or alteration of buildings. To do this job effectively and economically, the bureau should be permitted considerable latitude in the exercise of its professional judgment in connection with many problems arising during the construction of buildings. The bureau is now governed by time consuming procedures for the handling of such problems.

b. Procedure for Contract Modifications: The charter specifies that any changes in the construction of buildings, which occur after the contracts for such construction have been executed, and which cause a revision of the contract price, can be made only after a complete review of such changes by a number of city and county agencies. All such contract modifications must receive the prior approval of the assigned architect, the bureau of architecture, the director of public works, the chief administrative officer, the city agency for which the work is being performed, and the office of the controller, before the contractor is authorized to make any changes. In the case of the board of education, it takes approximately one month to obtain such modification approval. For other agencies it takes slightly less time.

There are two principal reasons for contract modifications, (1) government restrictions on the use of materials, and (2) inadequate architectural plans. The substitution of materials, as required by the National Production Authority, in most instances involves a change of cost and must be handled under the prescribed modification procedure.

In the construction of a large public building it is understandable that some modifications of architectural plans will be required as construction progresses. However, all such plans are reviewed at some length during each stage of their preparation, by the staff of the bureau, with the express purpose of recognizing and correcting all errors and omissions prior to actual construction. Such a lengthy and detailed review of plans should rectify most of the inadequacies of the plans and should keep subsequent changes to a minimum. In spite of such a review by the bureau architects, however, the bureau reports that it must process an unusually large number of modifications in the construction of new school buildings. This work involves the time and services of a great many people and considerably increases the cost. Contract modifications can be kept to a minimum if architectural plans are developed with a sufficient degree of completeness and if the review of the plans by the bureau is sufficiently thorough to assure such completeness. It is recommended, therefore, that the bureau make every effort to ensure the completeness of all architectural plans prior to the actual construction of buildings.

c. Authorization for Contract Modifications: All contract modifications are required by charter to be approved by the department head, the chief administrative officer, and the office of the controller prior to making actual changes in construction. If the requirement to get approval on all modifications were strictly adhered to by the contractors, the consequent delays would postpone the completion of a single building for many months and perhaps years. By making changes in construction without approval the contractor is taking the risk that he may not be paid for such changes. The risk element in the construction of public buildings is undoubtedly reflected in the cost of such construction. If a single city official were permitted to authorize changes in construction,at his own discretion, when such changes would increase costs by $2,000 or less, many delays would be eliminated and much of the risk element removed. It is usual in most governmental jurisdictions to permit the director of public works to authorize, in writing, contract changes and extras that cost less than a specified amount. Such change orders are effective when signed by the director of public works and the contractor. Copies of the change orders are forwarded to the accounting office for control purposes.

It is recommended that the charter be amended to simplify the contract modification procedure and that the director of public works be authorized to order, without other approval, changes and extras to contracts up to the amount of $2,000 for such work.

d. Cost of Inspection: The costs of making inspections for certain completed projects are shown in the following tabulation:

Project	Total Cost Of Project	Cost Of Inspection	Percent of Total Cost
New Projects			
Noriega Home School	$292,230	$7,909	2.7
Santiago Home School	255,895	5,696	2.2
Sunset Reservoir Home School	237,251	6,331	2.6
Fire Station - Engine #27	244,167	6,271	2.5
Fire Station - Engine #30	226,426	6,265	2.8
Mission Police Station	163,163	5,771	3.5
Alterations			
San Francisco Hospital-Service feeders	114,169	589	0.5
DeYoung Memorial Museum-Carpenter shop	18,637	1,787	9.5
City Hall-Law library	26,762	992	3.3

The figures in the above tabulation were compiled from the records of the bureau of architecture and the bureau of accounts and were not available to bureau officials in summary form. The city architect should have a similar tabulation available to him periodically for the purpose of analyzing inspection costs for all jobs.

The cost of inspection expressed as a percentage of the total cost of new projects does not vary widely; it ranges from 2.2 percent for the Santiago Home School to 3.5 percent for the Mission Police Station. These costs of inspection for new projects do not appear excessive with the possible exception of the Mission Police Station. Whenever the cost of inspection exceeds 3 percent of the total cost on new construction, bureau management should determine the cause and make efforts to keep the costs down on similar projects in the future.

The costs of inspection on alteration projects, as shown in the above tabulation, range from 0.5 percent of the total cost of construction to 9.5 percent. Althought it is understandable that inspection costs may vary considerably on alteration work due to the nature of the projects, a 9 percent range appears to be too large. In addition, inspection costs of 9.5 percent of the total cost of construction appear to be excessive. The cost of inspection on the DeYoung Memorial Museum carpenter shop addition is $1,787 or the equivalent of the cost of one inspector at the maximum rate for approximately 3-1/2 months. The use of a full time inspector or equivalent on a relatively small project should be viewed critically and justified conclusively, as being absolutely essential to the proper execution of the project.

It is reported that whenever several jobs are running concurrently at one location, inspection costs for all of the jobs are charged only against the largest job. This is done in order to eliminate some paper work. The net effect of such practice may not affect the total cost of inspection and the agency for which the work is done probably is not concerned with the bookkeeping arrangements of the bureau so long as the total costs are not unreasonable. However, the bureau is not able to analyze inspection costs, nor is it

able to maintain adequate controls on inspection costs unless such costs are kept for each individual project. Unless this is done, the reported inspection costs for projects are misleading and may lead to conclusions which are not warranted.

It is recommended that the bureau make periodic analyses of costs of inspection in order to determine the causes of excessive costs and take steps to eliminate or reduce such causes. It is further recommended that records of inspection costs be maintained to show the actual inspection costs for each individual project.

e. Records and Reports: The bureau maintains extensive and detailed records of each construction project. However, at the completion of a project the bureau shows only the construction cost of the project in its quarterly reports to the director of public works. The bureau does not keep records to show the total cost of each project to include the construction costs, architects' fees, state fees, and the cost of inspection. Such factors are a definite part of the cost of a building and should be included in the complete cost of construction.

All of the construction cost information is available either in bureau records or in the records of the bureau of accounts. It would be a simple matter to tabulate all costs and report the total cost of a building. It is, therefore, recommended that the bureau records be maintained to show the total costs of building construction and that such costs be used in reporting the complete cost of individual projects.

f. Time Reporting of Budget Personnel: The salaries of six employes in the bureau are contained in the budget appropriations of the bureau. These budget employes do not report any breakdown of their time by project. Some of these employes work almost exclusively on certain types of projects, and their time should be allocated to the projects. Time spent on construction or inspection work is a definite part of the cost of the work and should certainly be paid for out of the funds allocated for the work. Whenever a distribution of time shows that the time of a budget employe can be legitimately charged to a project or to certain kinds of projects, such a charge should be made. Present regulations do not permit charging the time of budget employes to a work order. It is, therefore, recommended that present regulations be revised to require the budget employes of the bureau to report daily the distribution of their time by project or account number and that such salary costs be distributed to the proper project and account numbers.

g. Programming Building Needs: The large capital investment the city and county has in its public buildings makes it desirable to have competent and experienced personnel inspect the buildings for major maintenance purposes. Thorough, periodic reviews of public buildings should be made and the city agencies responsible for the maintenance of the buildings should be advised as to repair, alteration, and general maintenance requirements. Such a review of public buildings would enable the city and county to program their maintenance needs in the order of their importance.

The most appropriate city government agency to review public building maintenance is the bureau of architecture, because of its experience in matters relating to building maintenance. The board of education makes such a maintenance review of its buildings at the present time. It is believed that the board of education should continue this review work and that the bureau of architecture should render necessary counsel and advice. The bureau should undertake the task of reviewing and programming the maintenance work in all other public buildings which at present are not receiving such attention. It is recommended, therefore, that the bureau of architecture be instructed to review and program the maintenance needs of all public buildings and to assist the board of education in its present maintenance review.

6. Office and Drafting Facilities

The staff of the bureau of architecture is located in two different parts of the city hall and in a nearby office building. This dispersal of the staff of a small bureau is not conducive either to good office operation or adequate supervision. Efficient supervision of design and drafting work necessitates a considerable amount of discussion as each problem is encountered. The present office arrangement makes difficult the frequent conferences which are desirable for the effective preparation of architectural plans and specifications. The divided arrangement is equally damaging to the effective conduct of office services for the several units in the organization, and sacrifices some operational flexibility. It is, therefore, recommended that a study be made for the purpose of securing better office space for the bureau of architecture.

7. Transportation

The bureau has assigned to it two city owned vehicles; one is a 1949 Ford sedan, and the other is a 1950 Ford sedan. The automobiles are assigned to the city architect and the supervising construction inspector. In addition, the assistant city architect is allowed a mileage expense of seven cents per mile for the use of his private automobile on official business. At times, when building inspectors are assigned to several projects at one time, they are allowed a similar mileage expense for the use of their private automobiles, although it is reported that such authorization is infrequent.

The amount of available transportation is adequate for the bureau for the present work volume. However, if the city architect discontinues the practice of making personal reviews of alteration requests, the head of the maintenance division, to whom this responsibility is assigned, will require transportation. Furthermore, if the recommendation to assign a part time position of supervisor for the temporary building inspectors is effected, additional transportation for that supervisor will be required. It is therefore recommended that the automobile assigned to the city architect be made available to the head of the maintenance division and that an automobile be rented for the part time building alteration supervisor in charge of the temporary building inspectors.

8. Expenditures of the Bureau of Architecture

The expenditures of the bureau of architecture for the fiscal years 1949-1950 and 1950-1951 and the budget appropriation for the current year are shown in the following tabulation:

	Expenditures		Budget
General Fund	1949-1950	1950-1951	1951-1952
Personal services	$30,779	$30,078	$38,195
Contractual services	381	269	410
Material and supplies	143	245	170
Equipment	2,012	2,011	-
Totals	$33,315	$32,603	$38,775

	Expenditures		Budget
Interdepartmental	1949-1950	1950-1951	1951-1952
Personal services	$196,434 a/	$235,714 b/	c/
Blueprints, mileage, & misc. charges	8,829	3,259	c/
Totals	$205,263	$238,973	c/

a/ Includes $31,010 overhead allocation of indirect labor, sick leave, etc.
b/ Includes $38,833 overhead allocation of indirect labor, sick leave, etc.
c/ Interdepartmental budget amounts not available.

The budget provides funds only for the general services of the bureau. Most of the work of the bureau is in connection with specific projects for other agencies and the personnel and material costs of the bureau are directly chargeable to the projects. Therefore, budget appropriations for such personnel and other services is not required.

CHAPTER V

STREET MAINTENANCE

1. Introduction

The maintenance of the streets of San Francisco is conducted mainly by the bureau of street repair, one of the important units of the department of public works. The work of the bureau consists principally in keeping in good condition the 795 miles of streets that have been paved and accepted. There are 188 employes in this bureau of whom 156 are engaged in actual maintenance activities, 23 are assigned to bridge operation, and 9 operate the city asphalt plant. The expenditures for 1950-51 were reported to be $1,002,349, and the appropriations for the current year are $1,010,666 not including resurfacing or interdepartment expenditures which cannot be estimated in advance.

In the early days of San Francisco, street construction and maintenance was the responsibility of a department of streets and highways headed by an elected commissioner of streets and highways. Later the name of the unit was changed to the department of streets, highways, and squares, and this arrangement continued until 1900 when the board of public works was created and the street work was divided between two bureaus of the new department. The engineering and construction of streets were placed under the new bureau of engineering and the maintenance was allocated to the new bureau of streets. The arrangement has continued essentially the same since that time, although sewer repairs and street cleaning, which were formerly in the bureau, have been separated and now form separate bureaus in the department.

The bureau of street repair does not do all of the street maintenance of the city. The patching and minor repair work is all performed by the bureau except for the repaving of the street openings made by the water department and by the utility companies. Some resurfacing and surface treatment work is done by the bureau (up to $2000 for one project) but the major part of this work is done by contractors under the supervision of the engineering forces. The division of traffic engineering is responsible for painting traffic lines and for repairing street and traffic signs.

The streets of the city are maintained generally in a safe and relatively smooth condition, but many of the pavements are old and some surfaces are becoming badly disintegrated and cracked.

Except for the interdepartmental work, the expenditures of the bureau are financed entirely from special road improvement funds allotted to the City and County of San Francisco from gas tax funds, under Assembly Bill No. 46 of the State of California, approved June 23, 1947, and commonly known as the Collier Burns Highway Act of 1947.

The part of street maintenance work that is done under the supervision of the bureau of engineering was discussed in Chapter III of this report.

2. Functions and Activities of the Bureau

The bureau of street repair is responsible for the repair and some of the resurfacing of the 795 miles of paved and accepted streets and highways of the City and County of San Francisco. In addition, the bureau makes temporary repairs on unaccepted streets and highways, maintains wood and concrete stairways on city streets, maintains two dumping areas for city use, and maintains and operates three bascule bridges. Specifically, the functions and activities of the bureau of street repair may be described as follows:

a. Making asphalt repairs to bituminous pavements by patching holes, evening surfaces, replacing sections of surface, and, when necessary, replacing pavement foundations with asphalt binder.

b. Sealing cracks in pavements with mixtures of sand and asphalt emulsion, cutting out broken or deteriorated pavement areas, and patching with bitumuls and gravel.

c. Making repairs to concrete, brick, and basalt block pavements.

d. Resurfacing pavements with asphalt mixtures up to a maximum cost of $2000 on any one project.

e. Armor coating or surface treating bituminous pavements with bitumuls and gravel.

f. Repairing certain state highways, the cost of this work being reimbursed by the state highway department.

g. Replacing or resetting granite curbing, replacing or repairing concrete curbing, and lowering granite curb for driveways.

h. Dressing, cleaning, and reconditioning used granite curbing.

i. Replacing pavement over trenches for the department of electricity and the bureau of sewer repair, the cost of such work being reimbursed by the bureaus served.

j. Maintaining and repairing stairways, retaining walls, and fences in city streets.

k. Paving and repairing sections of streets in the rights of way of the municipal railway, the cost of such work being reimbursed by that agency.

l. Operating a city-owned asphalt plant to provide four kinds of mixes for repair and resurfacing work.

m. Repairing those sections of sidewalk located within street intersections.

n. Raising, lowering, and replacing manhole and catch basin castings.

3. Organization and Staff

a. Present Organization Structure: The bureau of street repair is headed by a superintendent of street repair, a civil service employe, who is appointed by the director of public works and is responsible to the assistant director of public works for maintenance and operation. The present organization structure of the bureau, the number of positions in each unit, and the annual payroll cost as of August 15, 1951, are shown in the following tabulation (lines of descending authority shown by indentations of unit names):

Name of Unit	Title of Head	No. of Positions	Annual Payroll Cost
Bureau of street repair	Supt. of street repair	1	$ 7,800
Asphalt division	Genl.foreman of street repair	1	5,640
Asphalt plant	Foreman asphalt plant	9	35,850
Asphalt pavement repair	Foreman asphalt finisher	1	3,975
Resurfacing crew	Sub-foreman asphalt finisher	20	75,260
Resurfacing crew	Sub-foreman asphalt finisher	12	44,705
Repair crew	Sub-foreman asphalt finisher	7	25,170
Repair crew	Sub-foreman asphalt finisher	7	25,170
Repair crew	Sub-foreman asphalt finisher	7	25,170
Repair crew	Sub-foreman asphalt finisher	7	25,170
Clean up crew	Labor foreman	7	24,720
Clean up crew	Sub-foreman asphalt finisher	7	24,670
Pavement breaking	Chauffeur	3	12,040
Pavement breaking	Chauffeur	3	12,040
Heavy equip.operations [a/]	Chauffeur	1	5,040

Concrete division	Genl.foreman of street repair	1	5,640
Curb yard	a/	3	18,000
Curb resetting crew	Granite cutter	3	12,800
Manhole raising and brick paving crew	Paver	2	9,900
Concrete and pavement repair crew	Cement finisher	3	14,100
Concrete and pavement repair crew	Cement finisher	3	14,100
Concrete and pavement repair crew	Cement finisher	2	9,470
Pavement breaking crew	Chauffeur	3	12,040
Heavy equip.operations	Engineer of hoisting and portable engines	3	13,480
Clean up crew	Labor foreman	7	24,720
Clean up crew a/	Labor foreman	7	24,720
Clean up operations	Chauffeur	1	3,820
Public work yard	Laborer	1	3,400
Asphalt plant yard	Asphalt worker	1	3,475
Harrison St. stores	Laborer	1	3,400
Crack sealing division	Genl. foreman of street repair	1	5,640
Bitumul crew	Sub-foreman asphalt finisher	7	26,090
Bitumul crew	Sub-foreman asphalt finisher	7	26,090
Bitumul crew	Sub-foreman asphalt finisher	7	26,090
Bitumul crew	Sub-foreman asphalt finisher	7	26,090
Bridge division	Chief operating engineer	b/	2,880
3rd & Channel bridge	Operating engineer c/	8	30,064
4th & Channel bridge	Operating engineer c/	8	30,064
5rd & Islais Creek bridge	Operating engineer c/	7 d/	30,064
Watchman	e/	1	3,972
Watchman	e/	1	3,744
Totals		188	$733,273

a/ Operations performed by one chauffeur reporting directly to general foreman of street repair at head of the division.

b/ Half time position on work order from the bureau of building repair.

c/ Operating engineer in charge of each shift operating three shifts a day, seven days a week with a total of 12-3/5 positions of operating engineer and 10-1/2 positions of watchman for three bridges.

d/ Relief position not included but is counted in the number of positions of other bridges.

e/ No designated head of unit.

Some of the groups do not have official unit designations, the names in the above tabulation being those in common usage in the bureau.

There are several relationships in effect which are not reflected in the organization tabulation. The manhole raising and brick paving crew unit which is a part of the organization of the concrete division, does most of its work in connection with the asphalt repair crews and for the large majority of its jobs is actually under the supervision of the general foreman of street repair in charge of the asphalt division.

The asphalt worker who works as a general handyman at the asphalt plant is shown on the bureau's chart as being in the organization of the crack sealing division, but his time is reported by the general foreman of street repair in charge of the concrete division, and he is supervised mainly by the asphalt plant foreman. This position is shown as part of the concrete division in the above tabulation.

There is some disagreement as to the place in the organization of the laborer at the public works yard and the laborer at the Harrison Street pipe yard. The organization chart submitted by the bureau shows these units to be under the crack sealing division; however, the superintendent of street repair indicates that he has direct supervision and control over these employes. Inasmuch as the general foreman of street repair in charge of the concrete division reports the payroll time of these employes, they are placed in the concrete division in the above tabulation. A recommendation to transfer to the purchasing department the laborer at the Harrison Street pipe yard, who is included in the above tabulation, is made in another chapter of this report.

b. Present Staff: The number and classes of positions assigned to each unit in the bureau and the annual payroll cost as of August 15, 1951, are shown in the tabulation that follows (lines of descending authority are shown by indentations of position titles):

Position	No. of Positions	Rate of Pay Daily	Rate of Pay Monthly	Annual Payroll Cost
Supt. of street repair	1		$ 650	$ 7,800
Genl. foreman of street repair	1		470	5,640
Foreman asphalt plant	1	$19.02		4,755
Operating engineer	1		340	4,080
Dryer mixerman	3	17.52		13,140
Asphalt finisher	1	14.40		3,600
Asphalt worker	1	13.90		3,475
Laborer	2	13.60		6,800
Foreman asphalt finisher	1	15.90		3,975
Sub-foreman asph. finisher	6	15.40		23,100
Eng. of hoisting and portable engines	3	20.16		15,120
Chauffeur	10	15.28		38,200
Asphalt finisher	14	14.40		50,400
Asphalt worker	27 a/	13.90		93,825

Position	No. of Positions	Rate of Pay Daily	Rate of Pay Monthly	Annual Payroll Cost
Labor foreman	1	$15.60		$ 3,900
Chauffeur	1	15.28		3,820
Laborer	5[a/]	13.60		17,000
Sub-foreman asphalt finisher	1	15.40		3,850
Chauffeur	1	15.28		3,820
Laborer	5	13.60		17,000
Chauffeur	1	19.36		4,840
Laborer (pneumatic tool)	2	14.40		7,200
Chauffeur	1	19.36		4,840
Laborer (pneumatic tool)	2	14.40		7,200
Chauffeur	1	20.16		5,040
General foreman of street repair	1		$470	5,640
Granite cutter	3	24.00		18,000
Granite cutter	1	24.00		6,000
Laborer	2	13.60		6,800
Paver	1	26.00		6,500
Laborer	1	13.60		3,400
Cement finisher	1	19.36		4,840
Cement finisher's helper	2[a/]	18.52		9,260
Cement finisher	1	19.36		4,840
Cement finisher's helper	2	18.52		9,260
Cement finisher	1	19.36		4,840
Cement finisher's helper	1	18.52		4,630
Chauffeur	1	19.36		4,840
Laborer (pneumatic tool)	2	14.40		7,200
Engineer of hoisting and portable engines	1[a/]	20.16		5,040
Chauffeur	1	20.16		5,040
Laborer	1	13.60		3,400
Labor foreman	1	15.60		3,900
Chauffeur	1[a/]	15.28		3,820
Laborer	5	13.60		17,000
Labor foreman	1	15.60		3,900
Chauffeur	1	15.28		3,820
Laborer	5[a/]	13.60		17,000
Chauffeur	1	15.28		3,820
Laborer	1	13.60		3,400
Asphalt worker	1	13.90		3,475
Laborer	1	13.60		3,400
General foreman of street repair	1		$470	5,640
Sub-foreman asphalt finisher	1	15.40		3,850
Chauffeur	1	19.36		4,840
Laborer (pneumatic tool)	2	14.40		7,200
Laborer	3[b/]	13.60		10,200
Sub-foreman asphalt finisher	1	15.40		3,850
Chauffeur	1	19.36		4,840
Laborer (pneumatic tool)	2	14.40		7,200
Laborer	3[b/]	15.40		10,200
Sub-foreman asphalt finisher	1	15.40		3,850
Chauffeur	1	19.36		4,840
Laborer (pneumatic tool)	2	14.40		7,200
Laborer	3	13.60		10,200
Sub-foreman asphalt finisher	1	15.40		3,850
Chauffeur	1	19.36		4,840
Laborer (pneumatic tool)	2	14.40		7,200
Laborer	3	13.60		10,200

Chief operating engineer	c/	$480	$2,880
Operating engineer	3	380	13,680
Operating engineer	1	320	3,840
Watchman	3	312	11,232
Operating engineer	2	380	9,120
Operating engineer	2	320	7,680
Watchman	3	312	11,232
Operating engineer	3	380	13,680
Operating engineer	1	360	4,320
Operating engineer	1	192	2,304
Watchman	3	312	11,232
Watchman	1	156	1,872
Watchman	1	331	3,972
Watchman	1	312	3,744
	188		$733,273
Totals			

a/ One vacant position
b/ Two vacant positions
c/ Half time position on work order from the bureau of building repair

In addition, there is one general clerk-stenographer assigned to the bureau of street repair from the bureau of accounts.

c. Effect of the Scope of Maintenance Work on Organization: The operations of the bureau are considerably smaller in scope than those of comparable street maintenance agencies of many other metropolitan cities, in part because there is a relatively small area and consequently a relatively low street mileage to maintain, but mainly because the bureau does no street construction or reconstruction work and undertakes only very small resurfacing projects. The activities are limited in the main to repairs. The bureau does not even replace all of the cuts that are made in pavements for utilities work, but repaves only the openings made for sewers, for the department of electricity, and for the municipal railway.

Under the present organization plan, the street repair work is divided functionally into four divisions and the activities of each division are conducted on a city-wide basis. This arrangement is satisfactory generally for the present limited scope of work, but it might not be suitable if the work of the bureau is extended to include small construction and reconstruction projects, larger resurfacing jobs, and more complete replacement of pavement openings as proposed in this chapter.

If the operations of the bureau are expanded, consideration should be given to reorganizing the repair work on a district plan under which a general foreman or supervisor would be in charge of all of the work in a portion of the city and would be held responsible for the condition of the street facilities in that area. There might be two, three, or possibly four districts under such a plan. The work could still be conducted from one

central field office with common offices and shops, although there would be no objection to supplemental district yards and garages. The bridge operation activities would not be included under any district but would be a separate entity under the superintendent. Similarly, the construction and major resurfacing work could well be organized at the outset as a separate unit within the bureau, but if the volume of such work becomes great enough to justify three or four crews then consideration should be given to the decentralization of the activity to the districts.

d. Unequal Distribution of Work Load: The volume of work of the three pavement repair divisions of the bureau varies considerably, with the result that one general foreman of street repair has an extremely heavy work load and the others relatively light loads. There are 92 employes in the asphalt division in comparison with 42 in the concrete division and 29 in the crack sealing division. The head of the asphalt division under the present conditions is overburdened with work while the crack sealing foreman does not have a full load.

In an effort to relieve the asphalt general foreman of the impossible job of directing the work of eleven crews, the foreman asphalt finisher, who was formerly in charge of the larger resurfacing crew, was given a roving assignment of providing general supervision to the six asphalt repair and resurfacing crews. Undoubtedly such a supervisory assistant will help considerably, but it was noted during the field studies that the asphalt general foreman still gives supervision to these crews so that in effect his span of command has not been greatly reduced.

The three general foremen of street repair have the same civil service classification and are supposed to have duties and responsibilities that are reasonably equivalent, but it is probable that some change would be made if a reclassification review were made at the present time.

It is recommended that the street maintenance work of the bureau be reassigned among the three general foremen of street repair so that the amount and extent of responsibility are distributed reasonably equally and so that the work loads of these supervisors are about the same. This does not necessarily mean the abandonment of the present functional arrangement of maintenance work, but it does involve certain less radical shifts of duties to accomplish the result sought. For example, it may be desirable to place the asphalt plant, the two resurfacing crews, one clean up crew, and one pavement breaking crew in one division; to merge the four asphalt repair crews and the four crack sealing crews in another division with a clean up and a pavement breaking crew; and to leave the concrete division as the third unit substantially as it is now. Such an arrangement would be organizationally sound and still provide a much evener distribution of supervisory responsibility and work load. It is suggested that this plan of work assignment be considered for adoption.

e. Span of Control: There are far too many employes reporting directly to certain supervisors in the bureau to secure satisfactory direction and control. The superintendent has four major unit heads and two watchmen reporting to him, which is satisfactory, and the general foreman of crack sealing work has four sub-foremen, which is rather few for this class of supervisor, but the asphalt general foreman has eleven immediate subordinates, and the concrete general foreman has fifteen. In the latter case, some of the crews are rather small and some of the other subordinates work alone but they still require periodical surveillance. It is believed that the assignments should be consolidated by the reassignment of work so that not more than seven or eight foremen report directly to a general foreman.

f. Division of Responsibility: On certain activities, the fixing of responsibilities is not as precise as the organization charts indicate. The responsibility for curb resetting, for example, would appear to be placed completely in the concrete division, but actually the granite cutter in charge of the crew works under the asphalt general foreman when the resetting work is a part of an asphalt repair job and under the concrete general foreman on other jobs. Similarly manhole raising, nominally under the concrete division, becomes the responsibility of the asphalt division on resurfacing or other asphalt jobs.

Generally, curb work, concrete or brick gutter repairs, and manhole resetting are not so closely related to the actual pavement repair or resurfacing operations on a project that it is essential that the two parts should be under common control. On the contrary, it is usually desirable that curb or gutter work be done before the pavement work starts or after it is finished. It is therefore recommended that the concrete general foreman be made completely responsible for all curb work, concrete or brick gutter work, and manhole resetting work, and that the practice of transferring the crews to the asphalt division be abandoned.

g. Head for Curb Yard: The curb yard unit consisting of three positions of granite cutter does not have a designated head of the unit. Each of the three employes of this unit report directly to the general foreman of street repair in charge of the concrete division. This is not a desirable situation because it lengthens the span of control of the division head, makes supervision difficult, and does not define clearly the lines of responsibility and authority for the unit. Good management is promoted when each unit within an organization has a single head to whom responsibility can be assigned and authority delegated. If the present work methods are retained it is recommended that one position of granite cutter in the curb yard be reclassified and designated as head of the curb yard unit with full supervisory responsibility for the work of the curb yard. If the proposed mechanization of granite cutting is put into effect, it is recommended that the granite cutter be designated as head of the curb yard unit with responsibility and authority for the work of the unit.

h. Public Works Yard Laborer: One laborer from the bureau is assigned to do general yard and equipment maintenance work at the public works yard. There is no direct relationship between the functions of the bureau of street repair and the duties of this position. The building maintenance and yard duties performed should be transferred to the bureau of building repair. The duties connected with the care of equipment should also be transferred from the bureau. Equipment maintenance is discussed in another part of this report and it is there proposed that a central equipment control agency be created in the department. It is recommended that the duties of the position of public works yard laborer be transferred to appropriate agencies in the department of public works and that the employe be reassigned with a part of the work or be assigned to another position in the bureau.

i. Building Watchmen: There are now two positions of watchman in the bureau of street repair for the public works yard. The duties are those typical of a watchman position, but in addition include receiving and forwarding complaints during the hours of 5:00 p.m. to 8:00 a.m. for all four operation and maintenance bureaus of the department. The complaint duties of these positions are simple, inasmuch as they involve merely receiving a complaint by telephone and forwarding it to the designated employe in the bureau concerned. The predominant duties of the positions are more closely related to the functions of the bureau of building repair than to those of the bureau of street repair. It is, therefore, recommended that two positions of watchman be transferred from the bureau of street repair to the bureau of building repair.

j. Street Maintenance Clerical Work: A general clerk-stenographer from the bureau of accounts is assigned to do clerical work for the bureau of street repair. The time of this clerical position is divided in three ways, approximately 10 percent on clerical work for the bureau of street repair, 70 percent on work for the bureau of accounts in connection with the bureau of street repair, and 20 percent on other work for the bureau of accounts. The amount of time made available to do the general clerical work of the bureau of street repair is not adequate with the result that the superintendent and the division heads are required to do a considerable amount of routine work themselves. The supervisors of the bureau should spend as much time as is practicable in the field reviewing operations, and it is not economical to require them to spend a great amount of time in the performance of clerical duties. The clerical work of the bureau itself and the regular street repair clerical duties of the bureau of accounts are sufficient to justify the assignment of a clerk on a full-time basis so that the supervisory staff of the bureau can be relieved of most of their present clerical duties. The administrative control of this clerical position should be exercised by the bureau of street repair, but the functional control over payroll and other accounting matters should remain with the bureau of accounts, and appropriate procedures should be developed for the control of this work. It is recommended that a general clerk-stenographer be assigned to the bureau of street repair on a full-time basis to do the clerical work of the bureau and as much street repair clerical work as time permits for the bureau of accounts.

k. Proposed Organization Plans: It is evident that some reorganization of the street maintenance work is necessary to equalize the responsibility and work load, to reduce the span of command of two of the divisions, and to make the lines of authority clearer and more definite. Also, conditions in the field of street maintenance are changing and the organization of the bureau should be changed to accord with these conditions, and therefore any plan presented must necessarily be stated for a definite set of circumstances. It is probable, for example, that the extent of maintenance work will increase and methods will change considerably over the next few years and an organization plan that is proper for present work might not be suitable for the expanded duties or for different methods. It is apparent that some of the maintenance operations will have to be mechanized rather extensively in order to conduct the work effectively and economically, and these changes will also have a pronounced effect on the organization arrangements. To meet this situation, two organization plans will be proposed, one for immediate adoption to meet present circumstances and the other for future adoption if and when certain operations are extended and mechanized.

The organization plan for immediate adoption to effect the recommendations made in preceding sections, and suited for present operations is presented in the following tabulation:

Name of Unit	Title of Head of Unit
Bureau of street maintenance	Supt. of street maintenance
Asphalt repair division	Asphalt repair supervisor
Asphalt repair crews (4)	Asphalt repair foreman (4)
Bitumuls crews (4)	Crack sealing foreman (4)
Pavement breaking crew	Compressor operator
Cleanup crew	Labor foreman
Asphalt resurfacing division	Asphalt resurfacing supervisor
Resurfacing crew	Asphalt resurfacing foreman
Pavement breaking crew	Compressor operator
Manhole resetting crew	Paver
Cleanup crew	Labor foreman
Asphalt plant	Asphalt plant foreman
Concrete maintenance division	Concrete maintenance supervisor
Concrete crews (3)	Cement finisher (3)
Cleanup crews (2)	Labor foreman (2)
Curb setting crew	Granite cutter
Granite curb yard	Cutter foreman
Pavement breaking crew	Compressor operator
Bridge operation division	Chief operating engineer
Third St. bridge	Operating engineer
Fourth St. bridge	Operating engineer
Islais Creek bridge	Operating engineer
Clerical office	General clerk-stenographer

Under this plan the pipe yard laborer referred to earlier in this chapter, would be transferred to the purchasing department, the asphalt yardman would be incorporated in the asphalt crew if needed, and the public works yardman and watchman would be transferred to the bureau of building repair. The lights and barricade work would be under the supervision of the cleanup labor foremen.

This plan of organization for present conditions continues the functional arrangement of the work on a city-wide basis but creates a new division to handle resurfacing and armor coat work and the operation of the asphalt plant, and combines in another division asphalt repairs and bitumuls operations. It is recommended that this plan of organization be put into effect immediately.

The organization plan for future consideration is proposed for adoption if the scope of street maintenance work is extended as recommended in this report. It contemplates that the city should be divided into street maintenance districts with a street maintenance supervisor at the head of each district having complete responsibility for the repair of all pavements, curbs, and other street structures in his area. Two or three districts should be established at the start of the plan. The districts should be such that the central yard is reasonably close to each. At first at least, the resurfacing work should not be decentralized but should be handled on a city-wide basis. The proposed future organization plan is shown in the following tabulation:

Name of Unit	Title of Head of Unit
Bureau of street maintenance	Supt. of street maintenance
Street maintenance district No.1	Street maintenance supervisor
Asphalt repair crew	Asphalt repair foreman
Bitumuls crew	Crack sealing foreman
Concrete crew	Cement foreman
Pavement breaking crew	Compressor operator
Clean up crew	Labor foreman
Street maintenance district No.2 [b/]	Street maintenance supervisor
Street maintenance district No.3 [b/]	Street maintenance supervisor
Asphalt resurfacing division	Asphalt resurfacing supervisor
Resurfacing crew	Asphalt resurfacing foreman
Pavement breaking crew	Compressor operator
Cleanup crew	Labor foreman
Manhole resetting crew	Paver
Asphalt plant	Asphalt plant foreman
Bridge operation division	Chief operating engineer
Third St. bridge	Operating engineer [a/]
Fourth St. bridge	Operating engineer [a/]
Islais Creek bridge	Operating engineer [a/]

a/ Each shift
b/ The internal organization to be the same as for District No.1

Under this plan all patching, repairs, trench repaving, and general repairs to curbs, sidewalks, stairs, fences, and other street structures would be done by the districts. Normally, on resurfacing jobs the district crews should do the necessary curb resetting or replacing ahead of the resurfacing crews. The cutting out work in connection with resurfacing could also be done by the district forces, but the pavement breaking crew has been included in the asphalt resurfacing division. The granite curb yard would be supervised by the street maintenance supervisor of the district in which the curb yard is located.

4. Street Maintenance Procedures

a. General Statement on Procedures: The maintenance methods used by the bureau produce good repairs and much of the work is economically performed, but the rehabilitation of pavement surfaces is less effective and more expensive than it would be if certain operations were mechanized. The planning of street maintenance operations seems to have some shortcomings both in the overall arrangements for the conduct and control of pavement work and in the programming and scheduling of actual activities. Field supervision is generally inadequate to secure the best results, and records and operations analyses are not used effectively.

The operation of the three bridges is extremely expensive in relation to the extent of use of the waterways over which they are constructed. Some means should be found to reduce the cost of manning these bridges.

These and other related procedural matters dealing with street maintenance operations are discussed in the sections that follow.

b. Street Maintenance by Force Account: The bureau of street repair does all minor repairs to improved pavements except the repaving of utility openings made by the water department and by the utility companies. It also does some resurfacing of city pavements and armor coating work, but is limited to work costing less than $2,000 for each project by a charter requirement that all projects costing more than $2,000 must be done by contract. The bureau has not submitted bids on pavement resurfacing, construction, or reconstruction contracts as it is permitted to do under Section 95 of the charter.

The whole matter of conducting pavement reconstruction, resurfacing, and major maintenance projects by force account (in this case by the bureau of street repair doing the work using city employes, equipment, and materials) should be decided on a cost basis, regardless of whether the project cost is under or over $2,000. If the bureau of street repair can do the work, or certain kinds or amounts of work, as well and cheaper than can independent contractors, it should be permitted to do so within reasonable limits. Several large cities have clearly proved that their public works departments are able to do certain kinds of work substantially cheaper with city forces than by contract.

Small, unusual, and complicated construction and maintenance projects can usually be done cheapest and best by force account on direct assignment to the bureau, thereby making it unnecessary to prepare specifications, which on such projects are often difficult if not impossible to develop satisfactorily, and relieving the city of the expense of preparing contract plans and of conducting contract negotiations. The project cost at which it is reasonable to expect that the city can prepare plans and specifications, pay the contractor, and inspect the contract work, at a lower total cost than the total expense to the city for doing the work by force account should be fixed as the maximum limit for the direct assignment of force account work to the bureau of street repair. This maximum limit is now $2,000 for all kinds of work. This appears to be too low under prevailing conditions. It is suggested that the charter should provide a higher limit for pavement maintenance work. It is recommended that consideration be given to revising the charter to permit the department of public works to do certain kinds of work by force account up to a maximum limit of $5,000, but retain the present $2,000 limit for purchases.

It is entirely proper that the department should submit bids on certain kinds of contract work for which it is staffed and equipped and on which it can do the required work cheaper than contractors. Several well managed cities regularly follow this practice, sometimes with the idea of undertaking occasional jobs to keep contractors alert and in line, or to break up suspected collusion, but at other times because they have demonstrated their ability to do certain work cheaper than contractors.

Minneapolis, Minnesota, and Flint, Michigan, for example, have for many years undertaken construction and maintenance projects by force account. It is recommended that the bureau of street repair submit bids for those contracts which it is best able to undertake. At the beginning, at least, the practice should be restricted to small projects which by their nature can be done easier, better, and cheaper by the bureau.

It should be made clear that the bureau must demonstrate its ability to conduct small construction and maintenance projects efficiently. As provided by charter, total costs to the city, including indirect supervision, total equipment expense including depreciation, and overhead including sick leave, vacation, and other costs must be included in the project cost. It is not enough to show that individual projects can be handled less expensively by the bureau, because it is entirely possible to build up crews for performing certain kinds of work effectively, but unless such crews can be kept busy throughout the year, the gains on a few projects may be lost through idle time. On the other hand, the bureau should be given a fair opportunity to prove its worth by making available, on a modest basis, adequate staff and equipment to be able to carry out fundamental operations efficiently. It is especially important that an entire year's work be carefully planned on a work program basis so that the size and composition of the force can be accurately determined to provide for doing both minor and major maintenance effectively and without lost time. It is recommended that the amount of major work to be undertaken by the bureau be predetermined, as nearly as is possible, and that the size of the permanent force be fixed at that necessary to do all the work, both routine maintenance and major projects, without having to make additional work to keep crews busy and without having to secure extra or temporary help.

c. Repaving Utility Openings in Pavements: It was observed during the field studies of street maintenance operations that an abnormally high percentage of the asphalt repairs were being made over old pavement openings that had been repaved at an earlier time. Similarly many of the cracks that were being cut out and patched by the bitumal crews were along utility trench repaving. It appears that the pavements in many streets of the city would be in much better condition if utility cuts had been well repaired. It is believed that effective measures should be taken to reduce the present expense of maintaining pavements over utility openings.

At present, the bureau of street repair replaces the pavements over the trenches cut by the bureau of sewer repairs, the bureau of electricity, and the municipal railway. The openings made by the gas and telephone utilities and by the water department are repaired by contractors of those agencies. It is reported that the repairs over gas main trenches are well replaced but that those over the sewer and water trenches are not so well done. It is probable that most of the difficulty stems from faulty backfilling, either by replacing unsatisfactory materials or by compacting the backfilled material inadequately. Careless repaving of the openings will also result in rapid failure. One employe in the bureau of engineering is assigned to inspect utility trenches, backfilling, and repaving, but it is obviously impossible for him to watch each backfilling job, and no attempt is made to do so.

Many cities have had to face similar situations and have taken measures to prevent pavement deterioration and excessive maintenance expense. Utility companies, however good their intentions may be, are interested primarily in the underground repairs, and only incidentally in the pavement replacement. The agencies interested primarily in good pavement condition and inexpensive maintenance are the bureaus of engineering and of street repair. Consequently, many cities in recent years have changed their utility trench repavement procedures to improve the condition of backfilled trenches so that there will be no appreciable settlement after the repaving work is done. Some cities require that backfill material be carefully selected and that unsuitable excavated material be replaced with sand. They further require mechanical tamping of the backfill in thin layers, and provide positive inspection to see that the work is done properly. A few cities have provided that the backfill work must be done by city forces. Numerous municipalities stipulate that a permittee must place a temporary cold patch repair over newly backfilled trenches before they are opened to traffic. In such cases, permanent repairs are not made until the backfill has settled, and the length of time before permanent repair would depend mainly on the depth of a trench. By making the permanent repairs from one to three weeks after backfilling, it is possible for that work to be done more economically by avoiding scattered repaving jobs and by carefully scheduling the work. It is recommended that the present procedures for repaving utility openings be revised to require temporary paving of a cold patch or cut back mixture over each opening and to provide for delaying final repairs at least one to three weeks, depending on the trench depth.

Some communities have found it possible to obtain good pavement repairs over utility openings only by providing constant inspection of backfilling and paving work, and such control has proved to be very expensive. Some cities have found it desirable for the street maintenance forces to do the permanent repavement work over all openings and in many cases the utility companies have enthusiastically approved the practice because it is usually less expensive, and because the utility agency is relieved of further responsibility. It is recommended that consideration be given to placing the responsibility for all repavement of utility openings in the bureau of street repair.

The inspection of backfilling and paving now provided by the bureau of engineering should be continued whatever plan of repaving is adopted, but the extent of the inspection work should be proportioned to the need. Obviously, under present practices, more extensive inspection work is needed than can be provided by one inspector. On the other hand, if the city's maintenance forces do all of the repaving work after two or three weeks'settling of backfill, one inspector would probably be adequate. In this connection, written procedures for controlling backfilling and repairs to pavements should be developed by the engineering and maintenance units and approved by the director.

d. Asphalt Repairs: The six asphalt crews of the bureau make small and large patch repairs on asphalt streets, repave side sewer and department of electricity trenches, and resurface small areas ordinarily not over one block in length. Four of the crews do the patching re-paving of trenches, and the other two devote almost all of their time to resurfacing work. An analysis of the cost of asphalt repair and resurfacing work for the week of October 7 to 14, 1951, is given in the following tabulation:

Foreman	Area in Sq.Ft.	Expense: Personal Services	Equipment	Matl.	Overhead	Total	Cost per Sq. Ft.
Sclari	4,880	$ 562.80	$ 51.00	$237.17	$ 154.49	$ 1005.46	$ 0.206
Buttiner	4,850	639.80	51.00	125.74	168.02	984.56	0.203
Sustarich	4,565	637.30	51.00	189.11	170.80	1048.21	0.229
Carolli	5,990	634.80	51.00	179.47	169.71	1034.98	0.173
Total Repair	20,285	$2,474.70	$204.00	$731.49	$ 663.02	$ 4073.21	$ 0.201
Keane	25,200	$ 953.50	$102.00	$965.90	$ 287.10	$ 2208.50	$ 0.088
McCarthy	75,860	1593.80	204.00	2561.02	539.71	4898.53	0.065
Total esurfacing	101,060	$ 2547.30	$306.00	$3426.92	$ 826.81	$ 7107.03	$ 0.071

The average cost for all repair and resurfacing (121,345 sq.ft.) is $.092. Translated into costs a square yard, the repair unit cost is $1.82, and the resurfacing unit cost $0.64 which are normally very reasonable for this type of work. There is no indication in the above repair figures, however, as to what proportion of the patches are full depth and what proportion thin surface mix patches. The reporting was not complete enough to permit the two kinds of repairs to be analyzed separately.

Four types of asphalt mixes are regularly used on street maintenance work, the so-called surface mix which contains no rock, the Topeka mix which is a bituminous concrete mix, the binder mix for foundation work, and the school mix which contains small gravel or chips and is used predominately in school yards. Generally the range in types of mixes is adequate for present day street work. There may be some question, however, as to the design and control of the mixes. It is recognized that the asphalt plant is very old, but it should still be possible to produce stable, uniform mixes of the types used, particularly since liquid asphalt cement is used in all four standard mixes. There was evidence that some of the batches were very light on sand and appeared quite harsh and were relatively difficult to work. Several of the pavements and patches made as recently as a year ago are raveling and disintegrating badly. The difficulty may be in the material, but it is believed that much more attention should be given the design of the mixes, and that better control should be exercised over the mixes. It is recommended that more intensive research in materials, mixes, and methods be carried out, either by the bureau of engineering, or by the bureau of street repair.

The methods used on patching work are very good. In particular, the surface mix patch work is effectively and economically done. The resurfacing work, on the other hand, is not so satisfactory, and in particular, the surfaces are more uneven than they should be. The manual method of spreading is probably the cause of most of the difficulty but the type of mix used may be a contributing factor. Procuring a mechanical spreader for asphalt mixes as recommended elsewhere in this report should correct the unevenness and should also permit lower unit costs to be realized.

It may be seen in the table presented earlier that there is a considerable variation in the production and in the unit costs of the various repair crews and the two resurfacing crews. The sample on which this table is based is too small to warrant the definite conclusions that some crews are better than others, but it does indicate that further analysis of the performance and cost of the various crews on comparable work should be made as an aid to the administration of the activities.

e. Bitumuls Repairs: Four bitumuls crews of the bureau do extensive crack sealing work, make cold repairs to asphalt pavements, and surface treat pavements using asphalt emulsions. The crack sealing work is the most important activity of these crews under present practices. This may be simply filling pavement cracks with bitumul solution and sand, or it may involve cutting out the pavement near the cracks in order to remove the dirt which has raised the lips of cracks. In the former case, the work is simple and inexpensive, but, if cutouts have to be made, the work is many times more difficult and costly. The records do not show how much of the reported total amount of crack sealing is done by each method. Nevertheless, an analysis has been made of the crack sealing and pavement patching work from the reports of the four crews for the weeks ending September 14 and September 28. Only two crews were working during the first week examined, and in the second period one of the foremen (Bayles) did not report materials used according to standard procedure and therefore the work of his crew could only be included in the analysis when an entire day was devoted to a single kind of work. The comparative performance and cost are given in the following tabulation:

Crack Sealing

Foreman	Week Ending	Lin. Ft.	Personal Services	Materials	Equipment	Overhead	Total	Cost per Lin. Ftr
Tobin	Sept.14	21,000	$291.81	$ 14.80	$28.69	$96.75	$432.05	$ 0.021
Tobin	Sept.28	6,000	78.42	4.48	8.93	26.00	117.83	0.020
McGarvey	Sept.14	15,930	363.26	35.48	35.70	120.44	554.88	0.035
McGarvey	Sept.28	9,220	235.26	13.69	26.78	78.00	353.73	0.038
McCue	Sept.28	25,100	443.53	23.85	43.35	147.05	657.78	0.026
Totals		77,250	$1412.28	$92.30	$143.45	$468.24	$2116.27	Av.$0.027

Bitumul Pavement Repairs

Foreman	Week Ending	Sq. Ft.	Personal Services	Materials	Equipment	Overhead	Total	Cost per Sq. Ft.
Tobin	Sept.14	300	32.61	3.27	3.19	10.81	49.88	0.166
Tobin	Sept.28	4800	294.97	38.12	33.15	97.80	464.04	0.097
McGarvey	Sept.28	2460	136.16	14.20	15.30	45.14	210.80	0.08
Bowles	Sept.28	2000	167.92	28.39	20.40	56.01	272.72	0.136
McCue	Sept.28	94	26.09	3.60	2.55	8.70	40.94	0.435
Totals		9654	$657.75	$87.58	$74.59	$218.46	$1038.38	Av.$0.108

Armor coating

Tobin	July 14	1100	$84.79	$10.40	$8.29	$28.10	$131.78	$0.12

The sample of performance and cost analyzed above is rather small to portray accurately the relative capacity of the various crews. In some cases, the volume of work is small and the cost figures may be somewhat distorted by the disproportionate expense of moving to the site of the work. The armor coating or surface treatment work is discussed in a separate section.

It may be seen from the above tabulation, however, that the crack sealing work of one foreman for a two-week period cost almost twice that of another foreman. It was explained above that both simple and cutout crack sealing areincluded in the above figures, which may account for some of the difference, but it would appear that the supervisors concerned should be asked to account for such wide variations.

There is also a considerable spread in the unit cost figures for bitumul pavement repairs, but the two highest costs are for very small amounts of work. The significant information disclosed by this analysis, however, is that pavement patching by the use of bitumuls, costs on an average $0.108 a square foot while that by the use of hot asphalt mixes costs$0.201 - nearly twice as much. It was observed during the field studies that the same kinds of pavement were being patched by the two different methods under substantially the same conditions, although no extremely large patch was made with bitumuls during that time. It was explained by the superintendent that the selection of the streets to be patched by the asphalt and the bitumuls crews is largely determined by crew availability, except for the patching work that is done in conjunction with crack sealing.

It is recommended that a careful study be made of the relative merits of the two methods of patching so that the use of bitumuls patching may be increased if it is as satisfactory as asphalt patching. It is further recommended that tests be made of bitumuls patching, particularly of larger patches, using a small power roller to even the surfaces, and that accurate costs of this work be kept for comparison with costs of other methods.

It was noted that the amount of bitumuls patching done during a month is not reported by the bureau of accounts in terms of cost per square foot, but that such work is translated to a lineal foot basis by multiplying the patched area by four and adding the product to the lineal feet of crack sealing for the month and reporting the total as crack sealing. It would be just as easy to produce separate unit costs for the two kinds of work and thereby produce valid costs for both activities. It is recommended that the unit costs for bitumuls patching be reported on a square foot basis.

f. Armor Coating: The use of armor coating or surface treatment to prolong the life of pavement has been very limited despite an apparent need for an inexpensive means of maintaining many miles of streets that are not heavily traveled. It is reported that the attendant dust nuisance on armor coating projects is the reason that the method is not used more widely.

On the relatively small amount of armor coating work that is done, the bitumuls crews almost always apply two coats of asphalt emulsion and pebbles. All of the work is done by hand. The bureau has a 400 gallon distributor for spreading oils or emulsions on pavement surfaces but it is not used for armor coating or surface treatment work on pavements. The emulsion is applied by hand sprays from the regular 200 gallon repair tanks and the cover coat is spread by hand from dump trucks. An analysis of a few small armor coat jobs reveals an average cost of $0.12 a square foot or $1.08 a square yard, which is extremely high.

Many cities are effectively using surface treatment methods for the maintenance of low traffic volume streets. They have developed methods under which streets are cleaned, given a single coat of armor, and rolled for about ten cents a square yard, and the methods cause no dust nuisance whatever. Many cities use emulsions for this work so that the pavements may be cleaned with flushers and hoses just before the surface treatment is applied, thereby eliminating most of the dust that comes from the preliminary cleaning of the old surface. If the proper amount of hard rock chips is used and adequately rolled in, wind or traffic does not raise any dust from a completed surface treated pavement. Some cities have developed the surface treatment processes so well that only a few pounds of chips a block have to be removed after the work is completed, and sometimes such removal is done with street sweeping machines.

It is recommended that the bureau use the armor coating or surface treatment method of pavement maintenance much more extensively on residential streets or on any other low traffic volume street and that modern methods and suitable materials be utilized. If this method is used extensively, many miles of deteriorated and worn pavement surfaces may be effectively reclaimed. The bureau will have to secure a mechanical spreader to attach to the dump trucks to spread the chips uniformly over the oiled pavement surface and will have to purchase a suitable roller for consolidating the chips and oil into a smooth surface. A three-wheeled roller or a rubber tired roller is desirable, although a tandem roller will do satisfactory work under some conditions. The distributor on hand is rather small for the most economical operation, but it can be used at the outset if provision can be made to have supply tanks of emulsion or oil at the job site. It is recommended that a new chip spreader and a new roller be secured as soon as possible for this work.

g. Concrete and Miscellaneous Repairs: The amount of repairs to concrete and brick pavements is very small because of the relatively small mileage of these kinds of pavement in the city. The volume of sidewalk work is greater, but because of the small area placed at any one location, the costs are higher than they would be for more extensive projects. The bureau of accounts produces monthly unit costs for asphalt, brick, concrete, and sidewalk repair work and also for curb dressing and crack sealing. No costs are reported for curb setting or curb construction but total quantities and total costs are included in the detailed report for this work. A summary of the unit costs reported for 1950-51 is given in the following tabulation:

Month Reported	Date of Report	Asphalt Repairs	Brick Repairs	Crack Sealing	Granite Curb Dressed	Sidewalk Repairs	Concrete Pavement Repairs
July,1950	Sept.25	$.101	$1.745	$.029	$2.073	$ .841	
August	Oct.13	.089	.921	.033	2.001	1.029	
September	Nov.22	.090	1.097	.024	2.065	1.03	
October	Dec.15	.108	1.083	.023	2.064	.913	
November	Jan.23	.155		.040	2.076	.802	
December	Feb.21	.174		.029	2.135	1.07	
Jan.1951	Mar.27	.165	1.219	.032	2.124	1.208	
February	Apr.19	.129	.978	.029	2.179	.750	$ 2.297
March	May 18	.103	1.942	.015	2.183	.674	1.743
April	June 21	.099		.023	2.266	.837	1.585
May	July 25	.104	.602	.033	2.208	.878	1.486
June	Sept.11	.094	1.042	.023	2.108	.927	2.191
Average for Year		$.107	$1.041	$.027	$2.124	$.894	$1.623

The corresponding unit costs per square yard for pavement repairs are asphalt $0.96, brick $9.37,and concrete $14.61. The costs for brick and concrete are extremely high, probably because of the high labor costs on this kind of work, but it is suggested that some effort be made to reduce the cost of concrete repairs if any appreciable volume of work is expected.

It will be noted that the unit costs for concrete sidewalk repairs vary from 67¢ in March to $1.20 in January which seems too wide a difference to remain unexplained. The lower figure would appear to be a reasonably satisfactory cost for scattered small jobs. The larger one seems to be much too high.

It was observed that concrete for small jobs is mixed by hand at the site of the work. It may be necessary to do this when only small quantities are needed, but it would seem desirable to purchase ready mixed concrete whenever the minimum quantity that can be secured at one time is needed. The hand mixed concrete on several sidewalk jobs was much too wet to produce good concrete or to expedite finishing. Large quantities of dry cement were scattered over the top of the placed concrete to absorb the water so that the patch could be finished within a reasonable time. It is believed that the hand mixing practices for concrete should be examined and a written procedure for proper mixing be developed and put into effect.

The cost of concrete curb construction and repairs is about $1.97 a lineal foot which is not unreasonable for this class of work, particularly if the jobs are small ones. The cost of granite curb repairs averages $4.65 a foot which seems to be high considering that the cost of new or redressed curb delivered to the jobs is not included in the cost of the work. It is believed that these costs should be computed and reported monthly with other unit costs.

h. Mechanization of Curb Yard Operations: The curb yard is located on the street and sidewalk area of Daggett Street between 6th and 7th Streets. This is a temporary location and the bureau officials indicate that the street will soon be needed for its intended purpose and that a new site will have to be found. Some consideration has already been given to locating the yard on the same site as the proposed new asphalt plant. The present facilities are unsatisfactory and they should be improved when the move is made. This move, however, should not be made until a complete plan has been developed for the mechanization of handling, storing, cleaning, and dressing granite curb.

The manual methods now used in cleaning and dressing curb are inefficient and costly, and three granite cutters are needed to supply the bureau's demands for granite curb. Considerable saving could be realized by mechanizing this work. It is believed that one granite cutter and a helper with modern cleaning and dressing equipment can do at least as much work as is now being done by three granite cutters. The handling of granite curb could be done by the helper with a portable crane.

It is, therefore, recommended that modern equipment for the handling, cleaning, and dressing of granite curb be provided for the new curb yard. It is further recommended that two positions of granite cutter be eliminated and that one position of helper be established for the curb yard.

i. Two-Man Operation of Bascule Bridges: The three bascule bridges operated and maintained by the bureau of street repair are manned on a 24 hour a day, seven days a week basis with an operating engineer and a watchman assigned to each bridge for each eight-hour shift. The number of bridge openings on each shift for the three bridges for the fiscal year 1950-51, summarized from bureau reports, are shown in the following tabulation:

Bridge	7-3 Shift Annual Openings			3-11 Shift Annual Openings			11-7 Shift Annual Openings			Total Openings All Bridges
	Boat Passage	Other*	Total	Boat Passage	Other*	Total	Boat Passage	Others*	Total	
Third & Channel	326	40	366	180	6	186	198	1	199	751
Fourth & Channel	198	52	250	75	12	87	11	5	16	353
Third and Islais Creek	662	41	703	414	6	420	278	1	279	1402
Totals	1186	133	1319	669	24	693	487	7	494	2506

* Other openings consist of instruction lifts, maintenance lifts, and false alarms.

It was reported that the main reason for assigning a watchman to work with the operating engineer is to warn and control traffic at the end of a bridge opposite the control house. It was pointed out that the operating engineer has a limited vision of traffic at the far end of a bridge, especially when a bridge is in open position. The control booth at the Fourth and Channel bridge is level with the bridge surface and the field of vision for the operating engineer is somewhat limited. The control booths at the other bridges are high and permit the operating engineer a good view of the approaches to the bridges.

As shown in the above tabulation, the number of openings on all bridges is smallest during the 11:00 p.m. to 7:00 a.m. shift and averages less than one opening per day on that shift for each bridge. The amount of vehicular traffic crossing the bridges on that shift is also very limited. It is suggested, therefore, that it is not necessary to have a watchman on duty during the 11:00 p.m. to 7:00 a.m. shift. It is believed that a good warning system, adequate lights, and a strong barricade could very well make it unnecessary to employ a watchman on the night shift without endangering either vehicular or marine traffic. Department officials believe that the removal of a watchman would not violate any federal or state rules or regulations for the operation of bridges. It is, therefore, recommended that the position of watchman be eliminated during the 11:00 p.m. to 7:00 a.m. shift on all three bridges.

j. Night Operation of the Fourth & Channel Bridge: The fact that very few openings of the Fourth & Channel bridge are required during the 3:00 p.m. to 11:00 p.m. and 11:00 p.m. to 7:00 a.m. shifts, as shown in the above tabulation, indicates that substantial saving in operating expense can be made with a minimum of inconvenience to marine traffic by abolishing regular manning on these shifts.

The number of bridge openings during the 3:00 p.m. to 11:00 p.m. shift for channel traffic is 75 a year, or approximately one opening every five days. It is questionable whether a watchman is needed at that bridge for so few openings inasmuch as traffic could be safely controlled by the warning devices mentioned earlier. The high location of the control booth gives the operating engineer a good view of the approaches to this bridge, thus increasing the safety factor in one-man operation of this bridge. Maintenance and instruction lifts on this bridge should be confined to the 7:00 a.m. to 3:00 p.m. shift. It is, therefore, recommended that a position of watchman be eliminated during the 3:00 p.m. to 11:00 p.m. shift on the Fourth and Channel bridge as well as during the 11:00 p.m. to 7:00 a.m. shift.

During the entire fiscal year there were a total of 16 openings of the Fourth and Channel bridge on the 11:00 p.m. to 7:00 a.m. shift, of which 11 were for marine traffic, or an average of approximately one opening every 33 days for boat traffic. Of the 11 openings, 7 were between 6:00 a.m. and 7:00 a.m. Inasmuch as the annual personnel cost of operating one shift on this bridge is approximately $11,000, each opening on the 11:00 p.m. to 7:00 a.m. shift cost the city about $1,000 for the wages of an operating engineer and a watchman. The almost negligible amount of traffic passing through the bridge at that time does not warrant the continuing operation of the bridge during the 11:00 p.m. to 7:00 a.m. shift. An arrangement could be made with the chief operating engineer or the operating engineer on

the Third and Channel bridge to open the bridge in the event of an emergency or in cases of dire necessity. Under normal conditions, bridge openings could also be made during that shift by advance notification from the boat operators. Such notice would make it possible for the bureau to have a crew available during special bridge openings. Several other possibilities for the limited operation of all the bridges present themselves, including the establishment of a mobile crew to do all bridge operating work, or the replacement of certain bridges with higher structures, but the scope of this report does not permit a more detailed analysis of bridge operations. Such an analysis should result from a comprehensive administrative study of bridge operations and it is recommended that such a study be made.

Department officials indicate that the discontinuance of regular operations during one shift is not contrary to federal or state rules or regulations, although prior approval would have to be received from the State Board of Harbor Commissioners. It is recommended that such approval be sought immediately and that, as soon as the approval is granted, the operations of the Fourth and Channel bridge be discontinued during the 11:00 p.m. to 7:00 a.m. shift and that the position of operating engineer for that shift be eliminated.

k. Third & Channel Bridge Deck: The deck of the Third & Channel bridge is constructed of wood; the decks of the other two bridges are of steel construction. Wooden construction of bridge decks presents problems in maintenance and safety that should be carefully evaluated.

A wooden deck requires a considerable amount of maintenance, particularly in wet or damp weather. The deck must be treated with bitumals and fine gravel to prevent moisture from getting into the floor members. Although this is now being done, vehicular traffic disperses the coating and some water eventually gets into the planking and waterlogs the timber on the deck. When this happens the counterbalances on the bridge must be frequently changed and checked in order to keep the bridge balanced and in a safe operating condition.

The bureau is particularly conscious of a fire hazard on the Third and Channel bridge. The creosoted timber used in the bridge construction is highly inflammable. In the event of a fire the structure would undoubtedly become sufficiently warped to make the bridge permanently inoperative. The effect of such an accident on vehicular and marine traffic would be very serious indeed. In order to minimize the maintenance on the bridge and to ensure public safety it is recommended that the wooden deck on the Third and Channel bridge be replaced with a deck of steel construction.

l. Field Supervision: The time spent on field supervision in the bureau is inadequate to enable the supervisory staff to have constant and positive control of field operations. Such positive supervision is essential to the effective utilization of the bureau's manpower to insure that the work of the bureau is diligently pressed, to see that the proper methods and techniques are used, to arrange that service crews, equipment, and materials are at hand when needed, and generally to make sure that the

regulations, standard procedures, and policies of the bureau and the department are carried out.

In view of the present work volume, the superintendent should give substantial assistance in the supervision of the field work in addition to directing the activities of the bureau, and the handling of the necessary administrative details on street repair work. Some time of course must be reserved for planning and programming the future activities of the bureau. Nevertheless, it is believed that the superintendent should spend approximately two thirds of his time in the field and that division heads should endeavor to spend almost all of their time with their crews.

The use of such supplemental crews, as pavement breaking crews and cleanup crews which work for several units or division is effective only if strong and energetic supervision is exercised over the operations. Each supervisor should be in a position to know at all times what work is being done by his crews, the rate of work progress, the effectiveness of the methods, the work schedule of each, and the manpower, equipment, and material needs. Unless such close supervision is exercised, the supervisor has no way of knowing that his crews are doing satisfactory and efficient work.

The effect on supervision of the need for division heads to perform office clerical duties and of the large span of control, particularly in the asphalt and concrete divisions, is discussed elsewhere in the report, where it is recommended that the span be shortened and that a full-time clerk be assigned to handle all the clerical duties of the bureau. These recommendations should permit the supervisory staff to spend more time in the field and to use that time more effectively than at present. It is, therefore, recommended that the supervision of street maintenance operations be more complete and energetic, and that the supervisory staff of the bureau of street repair devote a considerable proportion of its time to field supervision, with the head of the bureau spending approximately two-thirds of his time in the field and the division heads devoting approximately 90 percent of their time to supervision and to field scheduling and planning.

m. Survey of Pavement Condition: The assignment of the various repair crews and the location of their work is dictated almost entirely by complaints received from citizens or transmitted through the director or the bureau of engineering. Some of the latter complaints result from inspections and the discovery of unsafe conditions. Even a part of the resurfacing work is selected on the basis of complaints received.

It is reported that the superintendent prepares each year a list of streets that need resurfacing. The list is reviewed and supplemented by the bureau of engineering and the director, but it is not used to plan the resurfacing work.

It is believed that a positive plan is a far better basis for scheduling and assigning work than complaints. It is recognized, however, that the present system is so firmly established that it will require several years to change to another arrangement. The bureau prides itself on the

prompt handling of complaints, and it is very desirable that they be answered at once and that the necessary corrections be made as soon as practicable. It would be immeasurably better, however, for the city to keep the pavements and other street structures in such condition, by detecting weaknesses before serious and dangerous conditions exist, that the volume of complaints is substantially reduced.

It is recommended that a survey of streets be made annually, on a systematic basis, to identify exactly the kind of work that needs to be done on each; that the work be classified according to urgency and according to the kind of work to be done; and that a plan and schedule of street maintenance work be developed from the information received. Under such a plan it will be possible to correct many conditions before they become troublesome, and to protect pavement surfaces before they disintegrate too badly to save or to care for inexpensively. Complaints will of course have to be answered while such an arrangement is being put into effect and that will have to be taken into account in preparing the programs and schedules for the first few years. Once the bureau has caught up on the worst conditions, the volume of complaints should decrease considerably and should eventually be very few.

n. Reporting Street Repair Work: The information shown on the field reports by crew foremen is generally complete and is adequate to furnish an analysis of the various maintenance operations and to produce comparative data on performance and cost. Actually little use is made of this information and the time spent by foremen in producing good field reports is largely wasted. The forms used in the reporting work are not particularly well adapted for the purpose, and they should be redesigned, preferably in correlation with the changes in the accounting procedures presented in another part of this report.

The bureau of accounts develops monthly reports of street maintenance operations, but the reports are so late as to be of little use in the administration of the work. These reports are quite detailed in that they list the jobs done during a month and show the total amount of work and the total cost of each major activity. This information has some limited use, but the operations are not analyzed by crews or by kinds of work included in a major activity classification, and an opportunity to aid the supervisors in the management of the work is lost. It is recommended that the cost accounting procedure be revised to provide for the development of useful and meaningful cost analyses by crews and by activity, and that an activity classification for street maintenance be developed. It is further recommended that cost accounts be furnished promptly after the end of the month to which they relate, so that the summaries and analyses are available to management not later than the tenth of the following month.

o. Unimproved Streets: The charter is not explicit in defining the department's responsibility to perform work on unimproved streets. Section 95 of the charter states that expenditures not to exceed $500 may be made for new construction upon unimproved streets. The charter makes no reference to repair work upon unimproved streets, although such work is being done by the bureau of street repair. It is questionable whether public funds can

be spent legitimately for this purpose unless the charter specifically authorizes such expenditures. Department authorities indicate that none of the available sources of information clarifies the city's responsibility for the performance of repair work on unimproved streets. Such a clarification appears to be essential to provide a legitimate and sound basis for departmental operations. It is therefore recommended that a policy be established defining the responsibility of the department of public works to perform specific kinds of work upon unimproved streets.

5. Equipment

a. Present Equipment: In general the bureau seems to be well provided with automotive and maintenance equipment for the methods now used, although there is some doubt whether the right equipment is made available for adequate and economical maintenance of pavements. The make, kind, size, and the date of purchase of the 56 pieces of equipment is shown in the following tabulation:

Passenger Cars

1 -	Plymouth sedan	1939
2 -	Chevrolet coupe	1941
1 -	Ford coupe	1947
1 -	Ford coupe	1949
1 -	Chevrolet coupe	1949

Pickup Trucks

4 -	Chevrolet 1/2 ton	1947
1 -	International 3/4 ton	1947

Dump Trucks

3 -	International (2 with compressors)	4 cu.yd.	1938
2 -	Mack (Bitumul with compressor)	4 cu.yd.	1938
1 -	Mack	4½cu.yd.	1938
1 -	Mack	4½cu.yd.	1939
2 -	GMC	4 cu.yd.	1945
1 -	Gar Wood	4 cu.yd.	1945
5 -	White	4 cu.yd.	1947
3 -	GMC	4 cu.yd.	1947
2 -	Reo	5½cu.yd.	1948
1 -	White	5½cu.yd.	1950
2 -	White	4 cu.yd.	1950

Cab and Chassis

1 -	Doane	5 ton	1934
1 -	Ford	1½ton	1941
1 -	Chevrolet, with 105 compressors	1½ton	1946
2 -	Chevrolet, with 105 compressors	1½ton	1948

Maintenance Equipment

2 -	Surface heater - Universal	1934
1 -	Sand loader - Farquhar	1935
1 -	Bitumin or weed sprayer 100 gallon	1935
1 -	Compressor - Chicago - trailer	1941
1 -	Roller, Gallion 5 to 8 ton	1945
2 -	Bitumin spray - Littleford 200 gallon	1946
2 -	Bitumin spray - Littleford 200 gallon	1947
1 -	Roller, Gallion 5 to 8 ton	1948
1 -	Grader, Gallion	1948
1 -	Roller, Wheeler 4 to 6 ton	1949
1 -	Asphalt distributor - Wisconsin 400 gallon	1949
1 -	Concrete saw - on Felker trailer	1950
1 -	Tractor & crane - Hughes Keenan 2 ton	1951
1 -	Tractor & bulldozer - Caterpillar D-6	1951

In addition, the bureau regularly rents eight trucks, seven of which are 1¼ ton dump trucks and one a 1½ ton dump truck.

b. Equipment Cost Records: The bureau of accounts maintains all equipment records for the bureau of street repair. At the time this report was being prepared the equipment record did not contain completed data for the fiscal year 1950-1951, and therefore the analysis had to be made from 1949-50 records. The unit costs of performance and maintenance for the bureau of street repair equipment for the fiscal year 1949-1950 are shown in the following tabulation:

Class of Equipment	No. of Vehicles	Average Mileage	Av. Cost Per Mile	Av. Miles Per Gal.	Average Expense				
					Repairs	Tires	Gas-Oil	Misc.	Total
Pickup - 1/2 ton	5	6817	$.0545	11.48	$33.89	$89.98	$137.07	$35.99	$356.45
Compressor trucks 1½ ton	4	4801	.0973	7.04	74.09	100.37	140.46	101.40	407.15
Low Bed 5 ton	1	697	.0426	2.17	150.85	14.57	58.96	3.68	297.27
Dump Truck 4 cu.yd.	16	6387	.1956	3.91	415.51	166.16	409.07	38.54	1170.77
Dump Truck 4 cu.yd.	2	9284	.1750	4.15	238.84	194.08	460.14	49.02	1160.02
Dump Truck 4 cu.yd.	3	5551	.1040	3.25	72.01	116.04	341.37	29.31	627.63
Asphalt Spray - 100 gal.	1				46.68			8.85	55.53
Asphalt Spray - 200 gal.	4				130.92		27.40	14.89	136.53
Asphalt Spray - 400 gal.	1								
Roller - 4 to 6 ton	1				120.22		69.57		189.79
Roller - 5 to 8 ton	3				682.02		375.51		1058.53
Grader	1				84.30		46.04		130.34
Compressor	1				399.75		243.15		642.90
Bulldozer	1				121.97		670.74		792.71
Sand Loader	1				14.80		1.76		16.56
Surface Heater	2				8.65		1.67		10.82
Burner	1				52.11		165.76		217.87

The equipment records kept by the bureau of accounts produce some valuable information that could be used to advantage in the replacement and retirement of vehicles and machines. Unfortunately, however, the record does not include all equipment costs, and the data are not summarized or reported in any manner. The time spent by bureau chauffeurs and laborers in washing, cleaning, adjusting, and maintaining the equipment is not included as equipment expense in the records but is charged to the jobs on which the equipment is currently working. Likewise, storage and depreciation charges are not taken into account in the records. It is recommended that all items of cost be included in the expense records for street maintenance equipment and that periodical reports of equipment expense and performance be summarized and reported promptly to the bureau and department officials.

c. Selection of Equipment: There are indications that requests of the bureau of street repair for equipment generally have been dealt with favorably by the budget making authorities. Although there seems to be a sufficient quantity of equipment for most operations there may be some question as to whether or not the proper size, kind, or type is selected to permit the most effective and economical conduct of the work of the bureau.

Equipment should be selected only after the type and extent of operations has been determined, so that the equipment can be fitted to the needs of the particular operations. It was observed, for example, that some of the rollers used on resurfacing work were too light to do the required job. Although the acquisition of inadequate or inferior equipment may be the result of arbitrary budget curtailments or of decisions in the purchasing department based on too little information of needs or of comparative performance, the bureau should make every effort to justify equipment requests on the basis of operational needs.

The bureau should make a detailed study of all its operating procedures to determine whether any would lend themselves to mechanization. Mention has been made elsewhere in this report of the desirability of mechanizing curb yard operations, of providing an asphalt spreader for resurfacing work, and of securing a chip spreader and a roller for surface treatment operations. The study of equipment needs should be made a part of routine administrative procedure. It is recommended that the kind, type, and size of needed equipment be selected carefully to meet the requirements of the work of the bureau, that precise specifications be developed to insure the acquisition of that equipment, and that justification statements to warrant the purchase of such equipment be prepared in detail.

d. Asphalt Plant: The present asphalt plant was originally constructed in 1915, and although certain improvements have been made since that time, the installation is obsolete and is well past its economically useful life. It is exceedingly doubtful if it would be prudent to spend the large amounts that would be necessary to rehabilitate the plant, which would involve replacing certain parts and revamping other

parts. The main objectives of the improvements would be to reduce the excessive amount of labor now required to operate the plant, to improve the mixing, and to increase the flexibility of the plant to produce some of the inexpensive mixes for street work. The latter two improvements may be achieved by alterations and replacements, but it would be economically unsound to attempt the amount of redesign of this plant necessary to reduce the cost of operating labor to a reasonable amount. At the present time, a bitumuls patching crew is brought to the plant to help unload cars of sand and stone every time a delivery is made. This not only increases the plant cost, but decreases the amount of repair work accomplished.

An excellent report on the municipal production of asphalt mixes has recently been prepared by the department of public works. This report discusses the relative advantages and disadvantages of three alternative plans for obtaining the bituminous mixes needed by the city for the maintenance of city streets - (1) revamping the present plant, (2) purchasing mixes from private plant operators, and (3) constructing a new municipal plant. It points out that the plant is not well located and that it is on relatively expensive property that could be sold and that the present plant could be disposed of, if it is decided to abandon it. It seems clear that the plant should be abandoned.

The big objection to purchasing the required mixes from private plants, other than that of possible higher price, is that unreasonable delays are certain to be experienced and would seriously affect the city's work, by idling whole crews while waiting for material. Actually many cities have faced this situation and have found it both necessary and economical to own their own plants. Numerous cities of 100,000 or 200,000 population have demonstrated the effectiveness and economy of a plant operated exclusively for city needs.

The size of a new plant should be carefully considered. It has been recommended herein that the scope of the city's maintenance activities be expanded. This would create a much greater demand on an asphalt plant than does the present level of work. It is believed that the city will expand its work within the next few years and the increased production should be taken into account in computing the unit costs of the mixes. Actually, the size proposed for the plant is overly large for the average of 160 tons a day now used, and it is believed to be over-conservative to base the case for a new plant with a probable average daily production of 500 tons on the present use of 160 tons.

It is believed that more extensive study of asphalt mixes should be made by the city, particularly with the idea of designing a new plant to produce cold mixes, and inexpensive road oil mixes, as well as the high grade liquid asphalt cement mixes. It is recommended that such study be conducted and that if warranted, the plant be designed to produce mixtures with two or more kinds of bituminous material.

6. Expenditures

a. Expenditure Records: The expenditures of the bureau of street repair for the fiscal years 1949-50 and 1950-51 and the budget for 1951-52, with the bridge operations shown separately, are presented in the following tabulation:

	Expenditures 1949-1950	Expenditures 1950-1951	Budget 1951-1952
Permanent salaries	$ 4,591	$ 6,360	$ 36,836
Allowance for holidays	860	546	800
Allowance for overtime	34	-	-
Temporary salaries	-	-	850
Leaves - replacements	4,494	142	-
Wages	549,040 a/	546,807 b/	488,427
Wages - sick leave	9,751	9,347	9,900
Contractual services	69,149	38,283	73,575
Truck hire	34,490	32,844	35,500
Materials and supplies	130,452	119,971	140,550
Equipment	30,190	21,236	9,350
Fixed charges	4,890	160	4,000
Retirement allowances	44,406	26,428	74,595
Services of other departments	16,680	10,206	14,456
Interdepartmental	116,559	87,931	-
Sub-totals	$1,015,595	$900,261	$888,839
Bridges			
Permanent salaries	$ 66,821	$ 84,510	$ 96,692
Allowance for overtime	-	142	100
Allowance for holidays	2,245	2,843	3,000
Leaves and replacements	1,535	848	-
Temporary salaries	2,766	4,506	4,789
Contractual services	2,008	3,706	4,793
Maintenance and repair of bridges	1,586	268	6,000
Materials and supplies	311	245	450
Services of other departments	5,096	5,020	6,003
Sub-totals	$ 82,368	$102,088	$121,827
Grand total for bureau	$1,097,963 c/	$1,002,349 d/	$1,010,666 e/

a/ Includes wages amounting to $123,642 for interdepartmental work.
b/ Includes wages amounting to $96,062 for interdepartmental work.
c/ Includes $240,201 for interdepartmental work.
d/ Includes $183,993 for interdepartmental work.
e/ Does not include interdepartmental work.

The expenditures for the fiscal year 1950-1951 are not complete because as of November 1, 1951, the actual figures for total expenditures were not available from the bureau of accounts. As of the same date, however, the bureau officials were preparing budget requests for the fiscal year of 1952-1953. Although work programs are not developed and used as a basis for budget preparation, the bureau head should at least have accurate expenditure figures upon which to base realistic budget requests. The absence of complete expenditure records reduces the entire budgeting process to conjecture and actually fosters excessive budget requests by the department head in the belief that it is better to ask for more just to be on the safe side. A discussion of expenditure and cost records and reports is contained in another chapter of this report.

b. Budget Preparation for Street Repair: The present method of preparing the budget in the bureau of street repair requires considerable modification in order that the requests of the bureau may reflect accurately the amount and kind of work it proposes to do. A brief discussion of budget preparation is considered to be pertinent.

A request by the bureau to spend public appropriations carries with it a responsibility for planning the use to be made of funds. In the preparation of annual budget requests for street maintenance, the bureau should formulate a work program for the operations contemplated for the year. Such a work program should first of all schedule the extent and location of all resurfacing work and the amount of each kind of work anticipated by the bureau. The unit cost of each kind of work should then be applied to determine the total appropriation that should be made. The scheduling of resurfacing, surface treatment, and other major work is not too difficult, and the necessity and location of such work can be forecast quite accurately. Although the minor repair work cannot be so accurately predicted, there is a more or less foreseeable amount of this work from year to year which can be estimated with reasonable accuracy.

Once the work program is adopted, the preparation of the budget merely requires a translation of the activities into the cost of labor, materials, supplies, and equipment necessary to carry out the work program. The present method of budgeting in the bureau by appropriating sums of money to be spent for labor, materials, supplies, and equipment without a work program does not indicate to the city administration how the money is to be spent, nor does it provide any means of comparing intentions with actual performance. The present method of budgeting, in effect, gives the bureau authority to spend the money without the responsibility of accounting its spending policy to the public.

If the bureau extends the scope of its activities, as recommended elsewhere in the report, it is even more important to program the proposed work and to state definitely the kind and amount of work it expects to do and the estimated cost of doing that work. It is, therefore, recommended that the bureau prepare its budget requests on the basis of a work program showing the amount and the unit cost of each activity; and that the total amount requested then be classified according to the character of expense for budget control purposes.

c. Expenditure Reductions: Substantial amounts of street maintenance funds can be saved if the recommendations contained in this report are put into effect. In certain instances, direct and definite savings can be made almost at once, but in others, the amount of saving is less tangible although not necessarily less important. The result of some improvements will very likely be an increased amount of work or better work rather than a budget reduction.

Some of the definitely identifiable savings are the elimination of the watchmen on the three bridges for the late shift and on the Fourth Street bridge for the 3:00 to 11:00 p.m. shift, an annual savings of $20,035; the closing of the Fourth Street bridge on the late shift to save $5,620 annually, and the mechanization of the curb yard to reduce the total expense by $2650 a year, allowing for the amortization of the cost of mechanization. Undeterminable savings will definitely result from the mechanization of the resurfacing and armor coating operations, from the revised method for repaving over utility trenches, and from the extension of bitumuls patching.

The intangible benefits and savings that will result from the organization changes and improved supervision and administration may very well be more important than the tangible.

d. Charges for Restoring Pavement over Utility Openings: The practice at the present time is to charge a flat rate for restoring the pavements over side sewer pavement openings in the bills that are prepared for side sewer installation or repair. The rate charged is one dollar a square foot, or nine dollars a square yard, which is very high for such work in comparison with the costs in other large cities. The cost here, however, includes cleanup expense for the whole job.

An analysis was made of all pavement repairs made during the week of Sept. 7 to 14, 1951, in order to show the approximate cost to the bureau of street repair for this work. The information secured is presented in the following tabulation:

Item of Expense	Area Sq.Ft.	Repair Cost	Cleanup Cost	Total Cost
Labor		$111.09	$69.71	$180.80
Overhead		28.15	17.66	45.81
Equipment		8.93	11.48	20.41
Materials		67.61	-	67.61
Totals	618	$215.78	$98.85	$314.63
Unit Cost per Sq.Ft.		$0.35	$0.16	$0.51
Unit Cost per Sq.Yd.		$3.15	$1.44	$4.59

This sample is too small to serve as a basis for determining the average unit cost of pavement replacement and cleanup work, but it does give an indication that the flat rates are too high. It is recommended that a more comprehensive analysis be made of the cost of pavement replacement over side sewer trenches, and that the rates charged be fixed at about the average actual cost.

It is believed that it is extremely important for the bureau to know its true unit cost for both repairs and cleanup so that if consideration is given to having the bureau do all permanent repair work over utility trenches, as is recommended in this report, there will be a legitimate basis for establishing fair rates.

In this connection, the fixing of flat rates for pavement replacement work is good practice. Most cities have abandoned the older procedure of collecting deposits, billing actual costs, and refunding balances, in favor of establishing standard unit costs for replacing asphalt, concrete, and brick pavements. The fixed rate basis has proved to be entirely satisfactory, in that citizens like the simpler procedure better and much clerical labor is saved. The established rates for the repavement of utility openings should, of course, cover all costs to the city, including the inspection of the operations by the bureau of engineering. The inspection cost for side sewer openings is now shown as a separate charge on the bills, and is discussed at greater length in Chapter III of this report.

e. Overhead Charges for Street Maintenance Work: The charter provides that the costs of major maintenance work be kept accurately to reveal the total cost to the city for doing the work so that it may be compared with similar contract operations. Overhead is specifically mentioned in the costs that must be included and the bureau of accounts is doing a very detailed job of computing overhead monthly. Actually indirect supervisory charges are added first, and then general overhead including sick leave, vacations, and miscellaneous expense is computed and added to the total. It is not believed to be desirable or necessary to compute separate actual percentages for indirect labor and for overhead each month. It is acceptable practice to estimate the overhead percentages on the basis of the preceding year's work and apply the fixed percentages for the first eleven months of the year and then make actual adjustments through an overhead account for the last month. This plan would save a great deal of work and time and would be just as accurate as the present plan. It is recommended that a simpler system of estimating overhead costs be adopted.

Overhead expense is not included in the charges for the asphalt mixes produced by the asphalt plant and used on various jobs. Instead the overhead on asphalt work is computed by adding the estimated amount of plant labor to the actual direct labor for the operations and then applying the overhead percentages. This is cumbersome and time consuming. It would be much better to treat the asphalt plant as a manufacturing process and to establish a revolving account so that the activity would be self-supporting through the sale of asphalt mixes. The entire overhead

expense of the plant would then be added to the direct costs of the mixes to determine the total price to be charged to the field operations for the materials. It is recommended that a revolving account be established for the asphalt plant and that the asphalt prices be fixed to cover the entire cost including overhead for producing the mixtures.